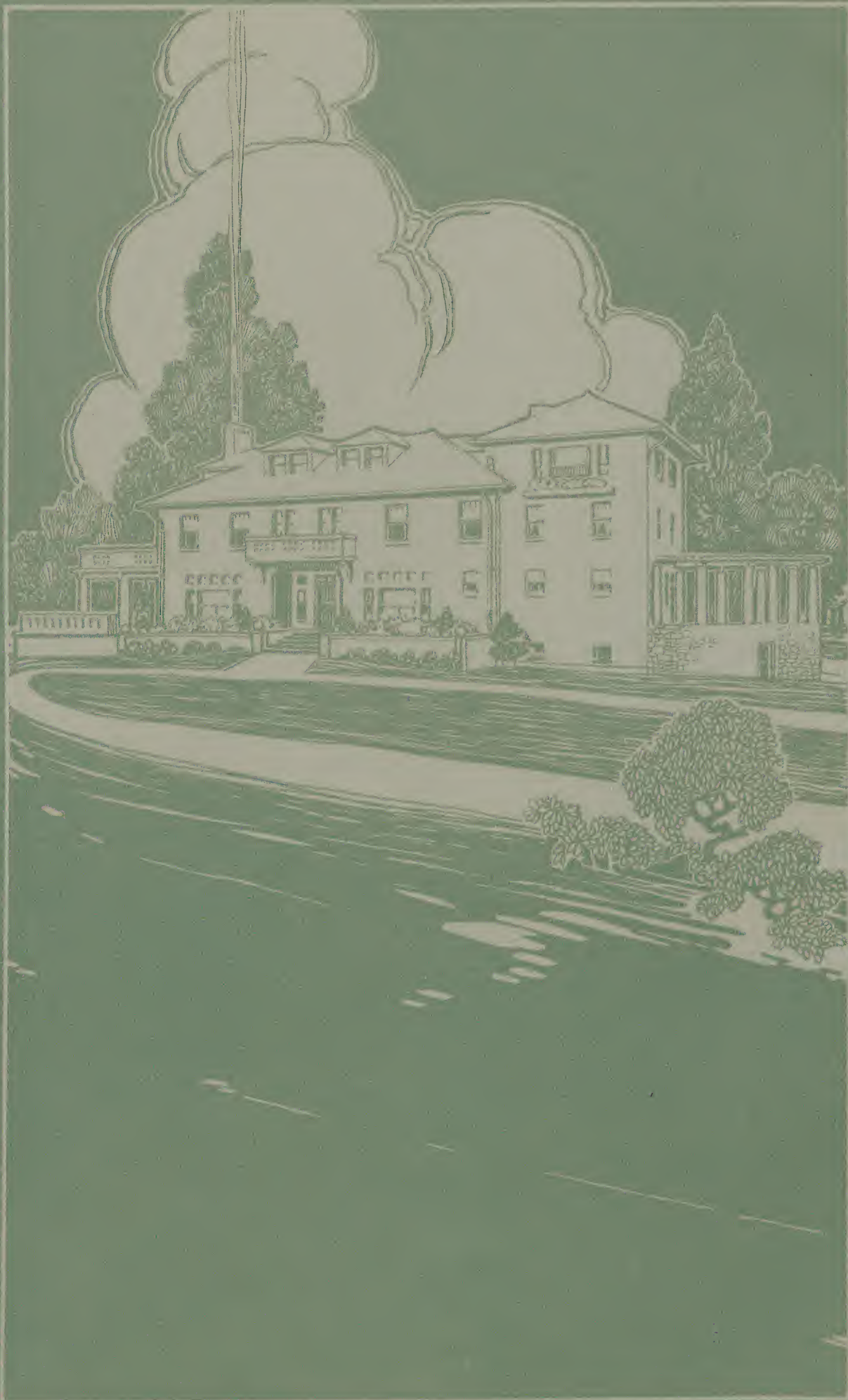


Fireproof Houses of
NATCO
HOLLOW TILE
and How to Build Them





The first sure symptoms
Of a mind in health
Is rest of heart : and
Pleasure felt at
home.

Young

FIREPROOF CONSTRUCTION



For Houses and
Other Buildings
of Moderate Cost



NATIONAL FIRE-PROOFING COMPANY

ORGANIZED 1889

MANUFACTURERS OF NATCO HOLLOW TILE

THE LARGEST COMPANY IN THE WORLD DEVOTED
SOLELY TO THE BUSINESS OF FIREPROOF CONSTRUCTION

PITTSBURGH, PENNSYLVANIA, Fulton Building

CHICAGO, Commercial Nat'l Bank Building
CINCINNATI, Union Trust Building
CANTON, City Nat'l Bank Building
DETROIT, Penobscot Building
MINNEAPOLIS, Lumber Exchange
LOS ANGELES, Central Building
TORONTO, Ontario

NEW YORK, Flatiron Building
PHILADELPHIA, Land Title Building
BOSTON, John Hancock Building
WASHINGTON, Colorado Building
COLUMBUS, West Broad Street
CLEVELAND, Chamber of Commerce Bldg.
MONTREAL, Quebec

SIXTH EDITION

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Pittsburgh, Pa., U. S. A.

Introduction to Sixth Edition



URING the previous five editions of this book, since 1908, when the first edition appeared, the fireproof hollow tile construction of residences and other minor buildings has progressed from a vague but unrealized ideal to an actual and widespread standard of practice. Thus in a period of less than four years the art of building, as applied to this class of structure, has made a greater and more important advance, in all likelihood, than in any previous century.

It is, however, not so surprising as may appear—that this change of standard practices has gone so far in so short a time.

When the National Fire Proofing Company introduced Terra Cotta Hollow Tile for constructions of moderate size, under the brand "Natco", it was simply the opening of a new field for a material that had already attained first rank in the fireproof construction of large buildings.

In this manner architects were immediately able to determine the exact value of Natco Hollow Tile for smaller building operations. Ample data as to its unequaled fireproof quality, its strength, its resistance to dampness, temperature and deterioration, was at hand, the result of years of appreciative familiarity with the behavior of the material under all conditions.

With the first announcement of Natco Hollow Tile for residence construction came a remarkable demonstration of professional approval. This took the form of orders from a large number of America's leading architects for Natco Hollow Tile to be used in building residences for their own ownership and occupancy. This substantial recognition has steadily increased; the proportion of Natco Hollow Tile ordered by architects for their own houses has continued to be one of the most notable phases of the rapidly extending demand for it.

With this sixth edition of "Fireproof Houses" the company believes it justifiable to state that Natco Hollow Tile has become universally recognized as preferable to brick, brick and wood, concrete, etc., for the construction of well planned residences.

One of the most gratifying evidences of this has come in the shape of large orders from the United States Government, whose stringent requirements, both from the standpoint of architecture and of engineering are well known.

In fact the time is long past when Natco Hollow Tile has carried any suggestion of experiment. It is standardized.

While the Eastern and Central part of this country still sees the largest proportion of Natco Houses in course of construction the demand is rapidly increasing in the West.



Natco Hollow Tile



Is precisely the same material, but adapted to residence construction, as is used by the National Fire Proofing Company in fireproofing great business and public structures. Recent examples of these are the Municipal Building, the Woolworth Building and Grand Central Terminal in New York. The Chicago City Hall and County Building, the Insurance Exchange Building and Chicago and Northwestern Terminal in Chicago, and other great structures built and now building on a similar scale.

It being entirely due to this Company that fireproof Hollow Tile was made available for residence construction, it was determined to stamp and identify the Tile made and adapted for residence use, as NATCO HOLLOW TILE. The word NATCO stamped on the outer side of each block serves as reliable identification. This feature is important, as competing tiles have eagerly begun to bid for favor in the new field of residence construction, with the hope that they will encounter less stringent requirements of quality than those which have operated so strongly in favor of the National Fire Proofing Company's genuine product.

Two scientifically established facts express the principal advantages of NATCO HOLLOW TILE, viz:

1. Well burned clay cannot be destroyed by fire.
2. A dead air space is the best insulation against heat or cold and consequently the best protection against the destructiveness of high temperatures as generated in burning buildings.

It is worth while for both architect and owner to bear in mind that the kind of buildings herein illustrated and described are not only Fire Resisting but are of

ENDURING MASONRY CONSTRUCTION THROUGHOUT.

Also, that by reason of the indestructibility of the material and their substantial construction these houses

COST FAR LESS FOR MAINTENANCE AND REPAIRS

than in the case with buildings of frame or brick-and-wood.

Floors of wooden joist construction warp and crack. Floors of Fireproof Hollow Tile endure for all time.

Exteriors of frame houses must be painted frequently; walls of Cement Coated Natco Hollow Tile, never.

Stucco applied over expanded metal has never proven satisfactory. Dampness will invariably work through and will cause the wood studs and siding to expand and settle. This will cause unsightly cracks to appear in the wall.

This difficulty has been eliminated by the use of Hollow Tile, which not only forms an ideal bond with the stucco, but furnishes a masonry wall which cannot settle.

Walls of wood or brick absorb, retain and carry to the interior of the house the frosts of Winter and the heat of Summer. The air space in walls of Natco Hollow Tile furnishes complete insulation against atmospheric conditions, thereby reducing the cost of heating to a minimum. Buildings of this material compared with brick, frame, stone, concrete or a combination of all four are

WARMER IN WINTER—COOLER IN SUMMER.

Houses with walls of brick, concrete or frame, and furred with wood, carry sound and vibration and are subject to the penetration and ravages of vermin. Natco Hollow Tile Houses require no furring and are

MOISTURE PROOF—SOUND PROOF—VERMIN PROOF.

When it is considered that a residence with all these advantages and completely Fireproof can be built at approximately as low cost as one of brick, brick-and-wood, stone-and-wood, or concrete, and comparing favorably with frame, there can be no hesitation in adopting this modern method of construction.

In considering the illustrations and plans in this book it should be noted that they are simply types and examples of what has been and can be accomplished with Natco Hollow Tile, and the methods of construction in use to achieve these results. The examples given range in cost from \$3,500 to \$100,000.

A house of any desired size or architectural appearance may be built on the general ideas advanced herein. These ideas are offered as an aid to the architect in formulating plans for small buildings of substantial fireproof construction. Any architect can readily adapt these principles to any building which he may be planning.

It will be seen that structural steel, which forms such a great item of cost in large, standard fireproof buildings, is entirely eliminated in buildings of the type considered in this work. The only manner in which steel is used at all in these buildings, is in the shape of small tension members for reinforcing purposes. It is this elimination of structural steel and the simplicity of Hollow Tile construction which makes it possible to build an enduring masonry residence fireproof throughout, within the limits of cost established by the average financial resource.

While NATCO HOLLOW TILE has been treated in the foregoing with more or less emphasis on residence construction, the scope of this term must be broadened to include all moderate sized buildings. Properly under this head are school houses, apartment houses, hotels, factories, garages, stores, stables and other buildings for special purposes which would formerly be planned of frame, brick or concrete, but which can now be better built with outside walls of Natco Hollow Tile.



Residence at Moylan, Rose Valley, Pennsylvania. Price & McLanahan, Philadelphia, Architects.

The four houses illustrated on this and the opposite page were built by the Rose Valley Improvement Company for the purpose of speculation. The outside walls in the above house are constructed of eight and six inch Natco Hollow Tile. The foundations are stone and the floors of wood construction. Cream color stucco was used with no waterproofing. The roof is of tile. This house measures 24 x 60 and has eleven rooms and one bathroom.



Residence at Moylan, Rose Valley, Pennsylvania. Price & McLanahan, Philadelphia, Architects.

The outside walls of this house are constructed of eight and six inch Natco Hollow Tile. The foundations are stone and the floors of wood construction. The stucco is of cream color with no waterproofing. The house measures 35 x 57 and has eight rooms and one bathroom. The roof is of tile.



Residence at Moylan, Rose Valley, Pennsylvania. Price & McLanahan, Philadelphia, Architects.

The outside walls of this house are constructed of eight and six inch Natco Hollow Tile. The foundations are stone and the floors of wood construction. Cream color stucco was used with no waterproofing. The house measures 37 x 58 and has twelve rooms and one bathroom. The roof is of tile.



Residence at Moylan, Rose Valley, Pennsylvania. Price & McLanahan, Philadelphia, Architects.

The outside walls of this house are constructed of eight and six inch Natco Hollow Tile. The foundations are stone and the floors of wood construction. Cream color stucco was used with no waterproofing. The house measures 24 x 60 and has eleven rooms and one bathroom. The roof is of tile.



The above illustration shows clearly the exterior appearance of a Natco house before the stucco has been applied. The illustration below shows the same house in a completed state.



Residence at Wilmette, Illinois.

William D. Mann, Chicago, Architect.

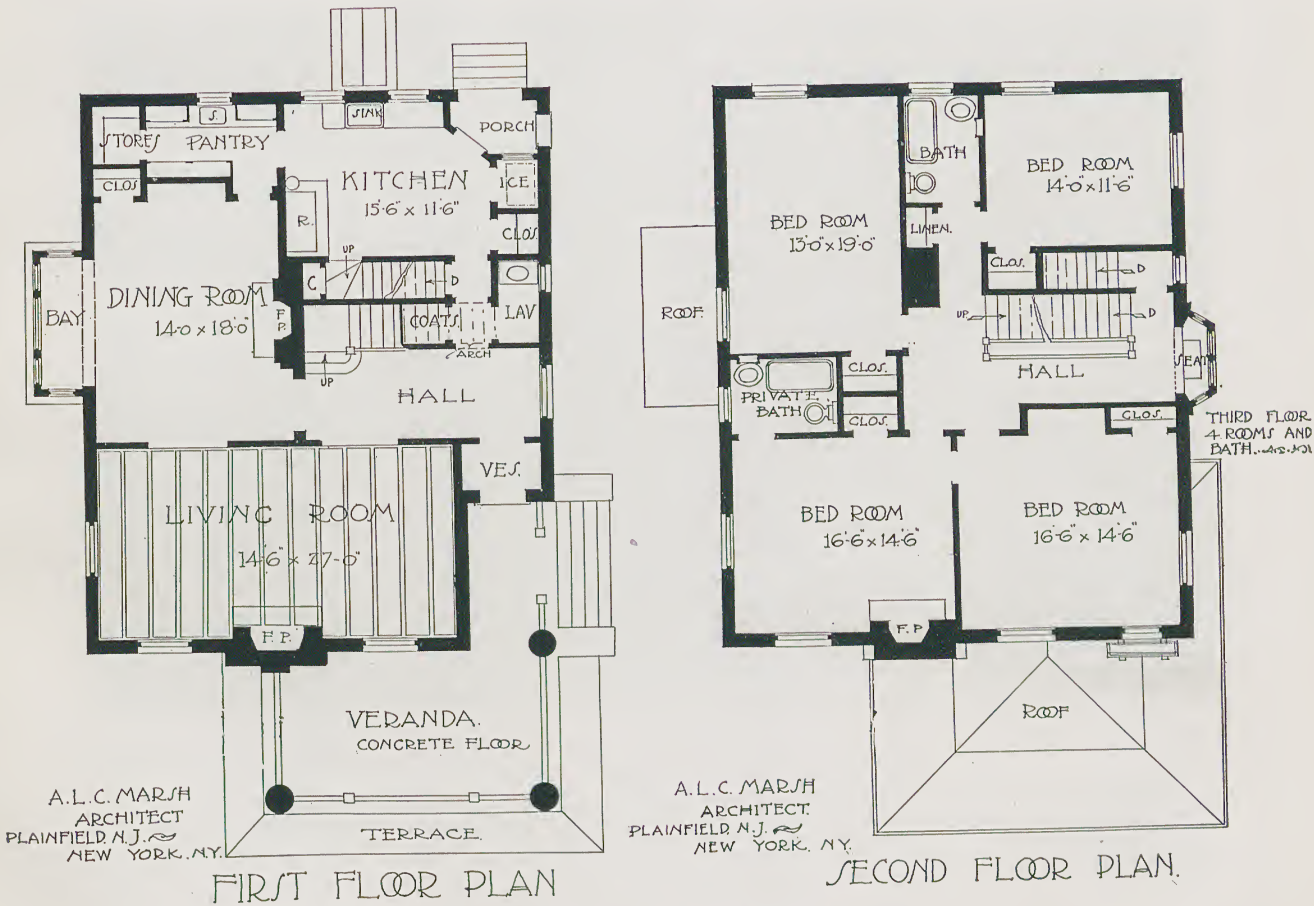
The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are electrical conduit seconds and the floors of wood construction. The stucco is white pebble dash with no waterproofing. The house measures 30 x 42 and has eight rooms and two bathrooms. The roof is shingle.



Residence at Plainfield, New Jersey.

A. L. C. Marsh, Plainfield, Architect.

The outside walls of this house are constructed of ten inch Natco Hollow Tile. The foundations are of Natco and the floors of wood construction. Natural gray stucco was used with a waterproofing compound. The house measures 35 x 42 and has eleven rooms and three bathrooms. The roof is shingle.



Floor plan of residence illustrated above.



Bungalow at Braddock Heights, Maryland. B. Evard Kepner, Washington, Architect & Owner.

The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are stone and Natco and the floors of wood construction. Gray stucco was used with a waterproofing compound. The house measures 40 x 50 and has eight rooms and one bathroom with an eight foot cement porch around the entire house. The roof is of olive dipped shingles.

This is another example of where an architect has designed his own home and is the strongest endorsement that can be offered towards the growing popularity of Natco Hollow Tile.



Residence at Bay Ridge, Brooklyn, New York.

Slee & Bryson, New York, Architects.

The outside walls of this house are constructed of ten and eight inch Natco Hollow Tile. The foundations are concrete and the floors of wood construction. White stucco was used with a waterproofing compound. The house measures 40 x 51 and has ten rooms and three bathrooms. The roof is of green Spanish tile.



Residence at Edgewood, Pennsylvania.

Charles Barton Keen, Philadelphia, Architect.

This is a thoroughly fireproof house throughout and is an example of the most advanced type of residence construction. The outside walls are constructed of eight inch Natco Hollow Tile. The foundations are twelve inch Natco and the floors of combination hollow tile and concrete. White stucco was used with no waterproofing. The house measures 41 x 51 and has nine rooms and four bathrooms. The roof is of tile shingles.



Residence at Schenectady, New York.

James E. Malony, Schenectady, Architect.

The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are stone and the floors of wood construction. Stainless white cement stucco was used with no waterproofing. The house measures 32 x 38, has nine rooms, two bathrooms and an extra toilet. The roof is of red slate.



Residence at Wheeling, West Virginia.

Charles W. Bates, Wheeling, Architect.

The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are brick and the floors of wood construction. Plain sand finish stucco was used with no waterproofing. There are twelve rooms and two bathrooms. The roof is of red tile.



Residence at Glen Ridge, New Jersey.

Frank Goodwillie, New York, Architect.

The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are of concrete and the floors of wood construction. Cream color stucco was used with waterproofing. The house measures 31 x 50 and has nine rooms and three bathrooms. The roof is of slate.



Residence at Wakefield, Massachusetts.

Harland A. Perkins, Boston, Architect.

This is a thoroughly fireproof house throughout and is an example of the most advanced type of residence construction. The outside walls are constructed of twelve, ten and eight inch Natco Hollow Tile. The foundations are stone and the floors of combination hollow tile and concrete. The stucco is white, with a waterproofing paint applied outside. The house measures 21 x 52 and has two wings each 20 x 36. There are twelve rooms and two bathrooms with an outside sleeping porch. The roof is of red tile.



Residence at Toledo, Ohio.

G. B. Rheinfrank, Toledo, Architect.

The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are of Natco and the floors of wood construction. White cement-floated stucco was used with no waterproofing. There are nine rooms and one bathroom, also a sleeping porch and sun parlor. The roof is of red Spanish tile.



Residence at Indian Springs, Columbus, Ohio.

Howell & Thomas, Columbus, Architects.

The outside walls of this house are constructed of ten inch Natco Hollow Tile. The foundations are of stone and the floors of wood construction. Gray stucco was used with no waterproofing. The house measures 30 x 60 and has twelve rooms and two bathrooms. The roof is shingle.



Residence at Locust Valley, L. I., New York.

Howard Greenley, New York, Architect.

This is a thoroughly fireproof house throughout and is an example of the most advanced type of residence construction. The outside walls are constructed of ten inch Natco Hollow Tile. The foundations are Natco and the floors of combination hollow tile and concrete. Gray stucco was used with no waterproofing. The house has an average width of 28 ft. x 190 ft. in length and has thirty-six rooms and twelve bathrooms, as well as a bowling alley in the cellar. The roof is of clay shingles.



Residence at Cumberland, Maryland.

George F. Sansbury, Cumberland, Architect.

The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are stone and the floors of wood construction. Gray stucco was used with a waterproofing compound. The house measures 38 x 54 and has eight rooms and two bathrooms. The roof is of slate.



Residence at Wayne, Pennsylvania.

Mellor & Meigs, Philadelphia, Architects.

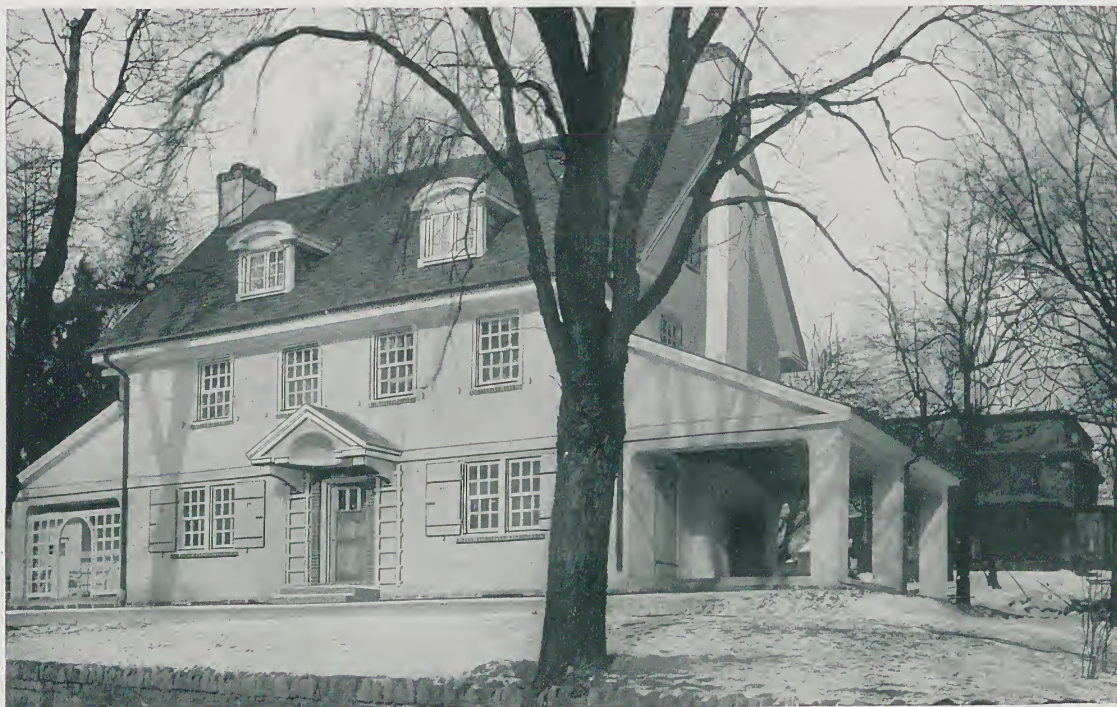
The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are stone and the floors of wood construction. Cream color stucco was used. The house measures 30 x 34 and has nine rooms and two bathrooms. The roof is shingle.



Residence at Sewickley, Pennsylvania.

Rutan & Russell, Pittsburgh, Architects.

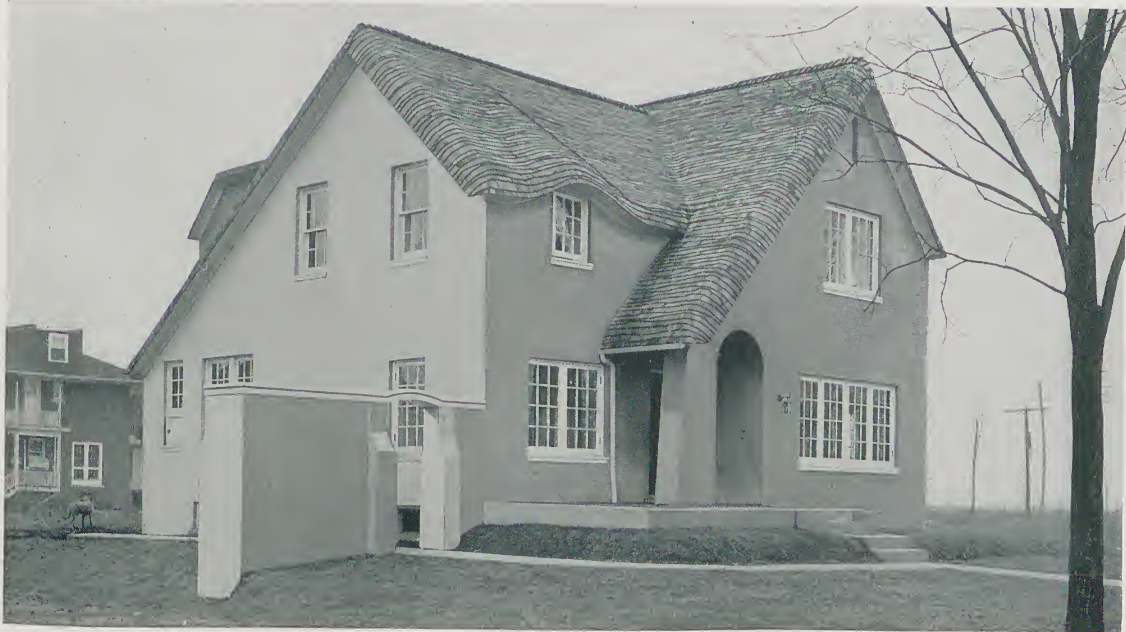
The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are stone and the floors of wood construction. The stucco is white watercolor with no waterproofing. The house measures 40 x 50 and has twelve rooms and four bathrooms. The roof is of tile shingles.



Residence at Merion, Pennsylvania.

Savery, Scheetz & Savery, Philadelphia, Architects.

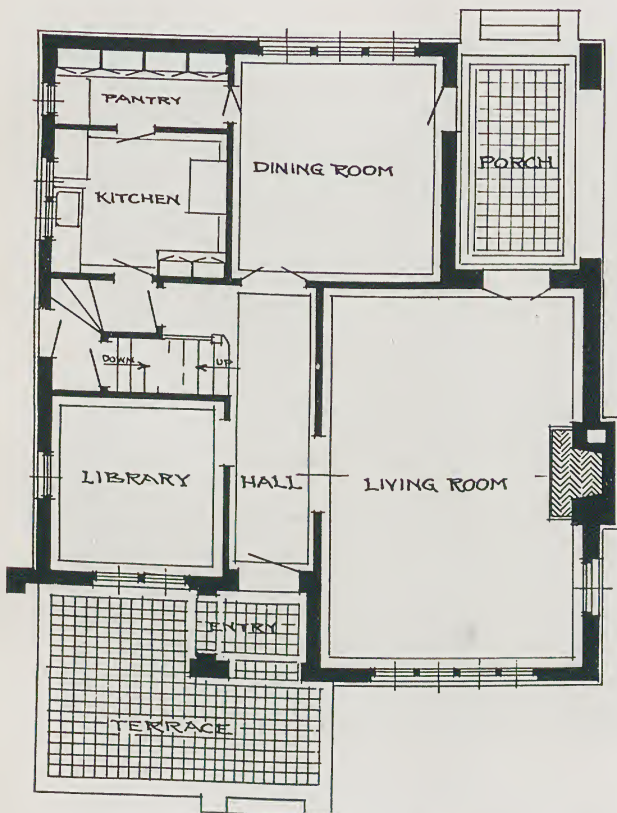
The outside walls of this house are constructed of Natco Hollow Tile. First story, twelve inch, second story ten inch and third story walls are eight inch tile. The foundations are stone and the floors of wood construction. White stucco was used with a waterproofing compound. The house measures 27 x 57 and has ten rooms and three bathrooms. The roof is of heavy slate, tinted green and purple.



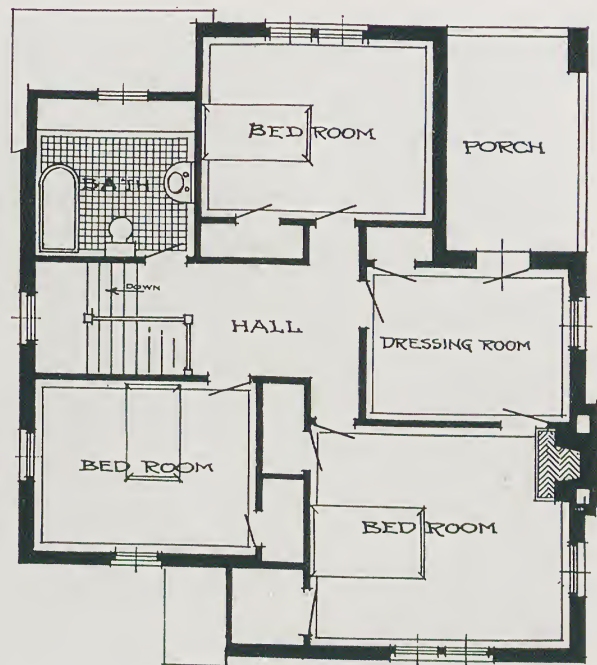
Residence at Detroit, Michigan.

Gordon F. Pickell, Detroit, Architect.

The outside walls of this house are constructed of twelve inch Natco Hollow Tile. The foundations are brick and the floors of wood construction. The stucco is natural cement color with no waterproofing. The house measures 32 x 36, has eight rooms, a sleeping porch and one bathroom. The roof is of shingle.



FIRST FLOOR PLAN



SECOND FLOOR PLAN

Floor plan of residence illustrated above.



Residence at Wilmington, Delaware. Thomas Podmore, Wilkes-Barre, and Leon W. Crawford, Wilmington, Associate Architects.

The outside walls of this house are constructed of twelve inch Natco Hollow Tile. The foundations are stone and the floors of wood construction. White stucco was used with a waterproofing paint applied outside. The house measures 50 x 73 and has fourteen rooms and three bathrooms. The roof is of Spanish tile.



Residence at Concord, Massachusetts.

James Purdon, Boston, Architect.

The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are concrete and the floors of wood construction. White stucco was used and when applied was mixed with a waterproofing compound. The house measures 25 x 34 and has six rooms and one bathroom. The roof is of shingle.

This is one of the best examples of a moderate priced house where Natco Hollow Tile has been used for exterior walls.



Residence at Glencoe, Illinois.

Spencer & Powers, Chicago, Architects.

The outside walls of this house are constructed of ten and eight inch Natco Hollow Tile. The foundations are concrete and the floors of wood construction. Rough cast stucco was used with waterproofing on the stone coat only. The house measures 24 x 58 and has ten rooms and three bathrooms. The roof is of red Spanish tile.



Residence at Pelham Heights, New York.

George A. Licht, New York, Architect.

This is a thoroughly fireproof house throughout and is an example of the most advanced type of residence construction. The outside walls are constructed of eight inch Natco Hollow Tile. The foundations are stone, the floors of combination hollow tile and concrete and the partitions of four inch hollow tile. Gray stucco was used with no waterproofing. The house measures 30 x 34 and has nine rooms and one bathroom. The roof is shingle.



Residence at Mount Vernon, New York.

George M. Bartlett, New York, Architect.

The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are stone and the floors of wood construction. Light cream stucco was used with a waterproofing compound. The house measures 37 x 42, exclusive of sun parlor, and has ten rooms and three bathrooms. The roof is of red tile.



Residence at Dayton, Ohio.

F. J. Hughes & Company, Columbus, Architects.

The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are concrete and the floors of wood construction. The stucco is bluish gray. The house measures 40 x 40 and has twelve rooms with a sleeping porch, two bathrooms and three toilets. The roof is of dark red tile.



Residence at Wichita, Kansas.

C. W. Terry, Wichita, Architect.

This is a thoroughly fireproof house throughout and is an example of the most advanced type of residence construction. The outside walls are constructed of eight inch Natco Hollow Tile. The foundations are brick, the floors of combination hollow tile and concrete and the partitions of hollow tile. Buff rough cast stucco was used with no waterproofing. The house measures 38x52 and has ten rooms, one bathroom and four lavatories; also a porte cochere. The roof is of tile.



Residence at Bryn Athyn, Pennsylvania.

Walter F. Price, Philadelphia, Architect.

The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are stone and the floors of wood construction. Smooth white stucco was used with a waterproofing compound. The house measures 30 x 64 and has twelve rooms and three bathrooms, including a large studio which occupies nearly the entire third story. The roof is of slate. All of the windows in the main part of the house open in, being French casements.



Residence at Newark, New Jersey.

Hurd & Sutton, New York, Architects.

The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are brick and the floors of wood construction. White stucco was used with a waterproofing compound. The house measures 28 x 48 and has eleven rooms and two bathrooms. The roof is of Spanish tile.



Residence at Normal, Illinois.

A. L. Pillsbury, Bloomington, Architect.

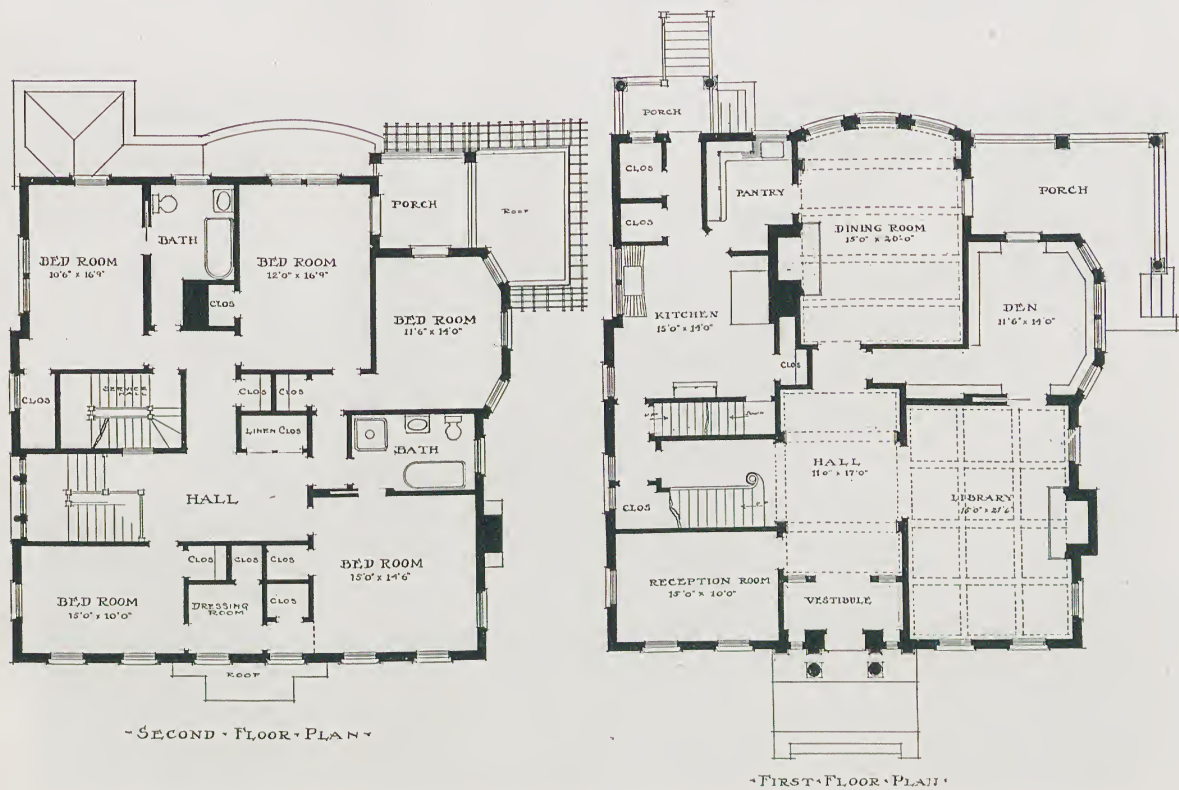
The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are Natco and the floors of wood construction. White smooth finish stucco was used with no waterproofing. The house measures 25 x 36 and has nine rooms and one bathroom. The roof is of red tile.



Residence at Newark, New Jersey.

Fred M. Truex, New York, Architect.

The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are brick and the floors of wood construction. The stucco is light gray and when applied was mixed with a waterproofing compound. The house measures 44 x 49 and has fourteen rooms and three bathrooms. The roof is of green slate.



Floor plan of residence illustrated above.



Residence at Detroit, Michigan.

John Scott & Company, Detroit, Architects.

This is a thoroughly fireproof house throughout. The outside walls are sixteen inches thick, the inner four inches being of Natco Hollow Tile. The foundations are concrete, the floors of combination hollow tile and concrete and the partitions of hollow tile. The house measures 54 x 60 and has fifteen rooms and three bathrooms. The roof is shingle.

This is an excellent example of the combined use of stone and Natco Hollow Tile for exterior wall construction.



Residence at Duquesne, Pennsylvania.

Janssen & Abbott, Pittsburgh, Architects.

The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are glazed tile and the floors of wood construction. White stucco was used with no waterproofing. The house measures 26 x 80 and has twelve rooms and three bathrooms. The roof is of green shingle.



Residence at Newton Centre, Massachusetts.

A. G. Richardson, Boston, Architect.

The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are concrete and the floors of wood construction. Gray stucco was used with no waterproofing. The house measures 35 x 52, has ten rooms and one bathroom, also a sun piazza, porte cochere and Loggia. The roof is red tile.



Residence at Chevy Chase, Maryland.

George Oakley Totten Jr., Washington, Architect.

The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are brick and the floors of wood construction. Light gray stucco was used with no waterproofing. The house measures 46 x 46 and has eleven rooms and three bathrooms. The roof is of tile.



Residence at Evanston, Illinois.

John A. Nydan, Chicago, Architect.

The outside walls of this house are constructed of twelve and ten inch Natco Hollow Tile. The foundations are concrete and the floors of wood construction. White pebble dash stucco was used, the dash coat of which was waterproofed. The house measures 33 x 56 and has twelve rooms and three bathrooms, as well as seven rooms in the basement not included in the above. The roof is of tile.



Residence at Detroit, Michigan.

H. W. Allen, Detroit, Architect.

The outside walls of this house are constructed of twelve inch Natco Hollow Tile. The foundations are brick and the floors of wood construction. White stucco was used with a waterproofing compound on the inside of the walls. The house measures 30 x 45 and has eight rooms and two bathrooms, also a sleeping porch. The roof is of moss green French tile. The garage measures 16 x 24 and is of similar construction.



Residence at Sagamore, Bronxville, New York.

Bates & How, New York, Architects.

The outside walls of this house are constructed of four inch brick backed up with six inch Natco Hollow Tile. The foundations are stone and the floors are of wood construction. The house measures 31 x 53 and has twelve rooms and three bathrooms. The roof is of slate.

For those preferring an exterior finish of brick to that of stucco, this is an excellent type of construction.



Residence at Milwaukee, Wisconsin.

Leiser & Holst, Milwaukee, Architects.

The outside walls of this house are constructed of twelve and eight inch Natco Hollow Tile. The foundations are Natco and the floors of wood construction. Buff stucco was used with no waterproofing. The house measures 31 x 36 and has nine rooms and one bathroom. The roof is of shingle.



Residence at Moberly, Missouri.

Charles S. Holloway, St. Louis, Architect.

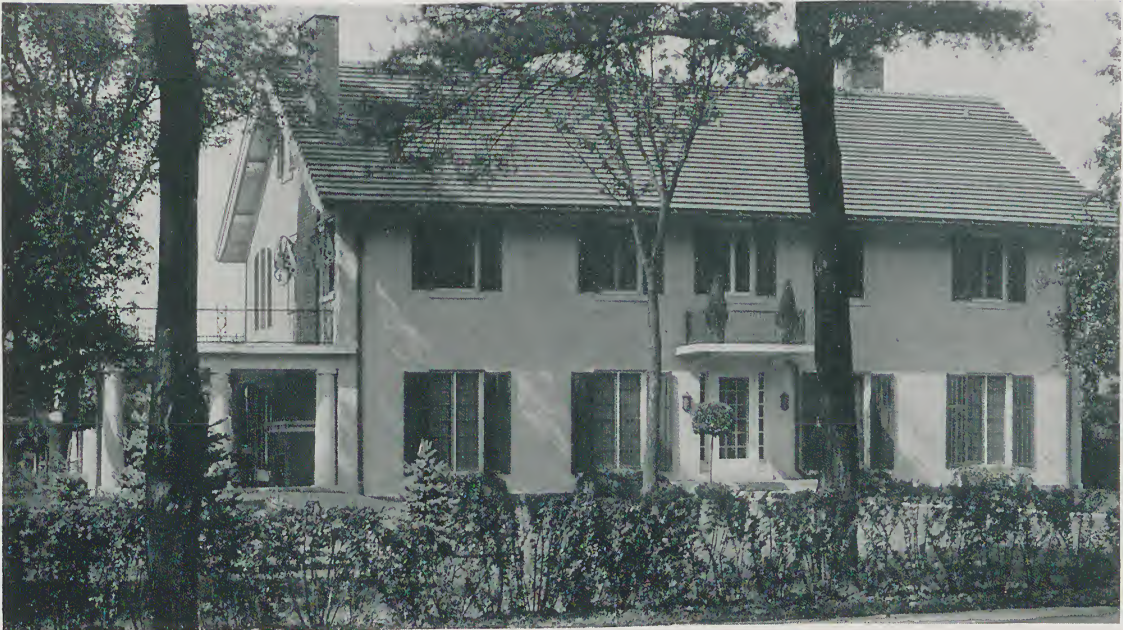
The outside walls of this house are constructed of ten inch Natco Hollow Tile. The foundations are poured concrete and the floors of wood construction. Natural rough cast cement stucco was used with no waterproofing. The house measures 36 x 52 and has thirteen rooms and two bathrooms. The roof is of red tile.



Residence at Pittsburgh, Pennsylvania.

Henry M. Kropff, Pittsburgh, Architect.

The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are concrete and the floors of wood construction. The stucco is natural cement color with no waterproofing. The house measures 30 x 31 and has seven rooms and one bathroom. The roof is of slate.



Residence at La Grange, Illinois.

C. Frank Jobson, Chicago, Architect.

The outside walls of this house are constructed of ten and eight inch Natco Hollow Tile. The foundations are concrete and the floors of wood construction. Rough cast white stucco was used with no waterproofing. The house measures 34 x 61 and has twelve rooms and three bathrooms. The roof is of green shingle tile.



Residence at Passaic, New Jersey.

Edward P. Doane, Passaic, Architect.

The outside walls of this house are constructed of ten and eight inch Natco Hollow Tile. The foundations are of Natco and the floors of wood construction. The stucco is dark gray and when applied was mixed with a waterproofing compound. The house measures 30 x 45 and has eleven rooms and one bathroom. The roof is of slate.



NATCO HOLLOW TILE



Residence at Newton, Massachusetts.

Chapman & Frazer, Boston, Architects.

The outside walls of this house are constructed of brown Roman Brick $1\frac{1}{2} \times 4 \times 12$ backed up with ten and eight inch Natco Hollow Tile. The foundations are stone and the floors of wood construction. The house measures 49 x 84 and has seventeen rooms and five bathrooms. The roof is composition. For those preferring an exterior finish of brick to that of stucco, this is an excellent type of construction.



Residence at Detroit, Michigan.

Varney & Winter, Detroit, Architects.

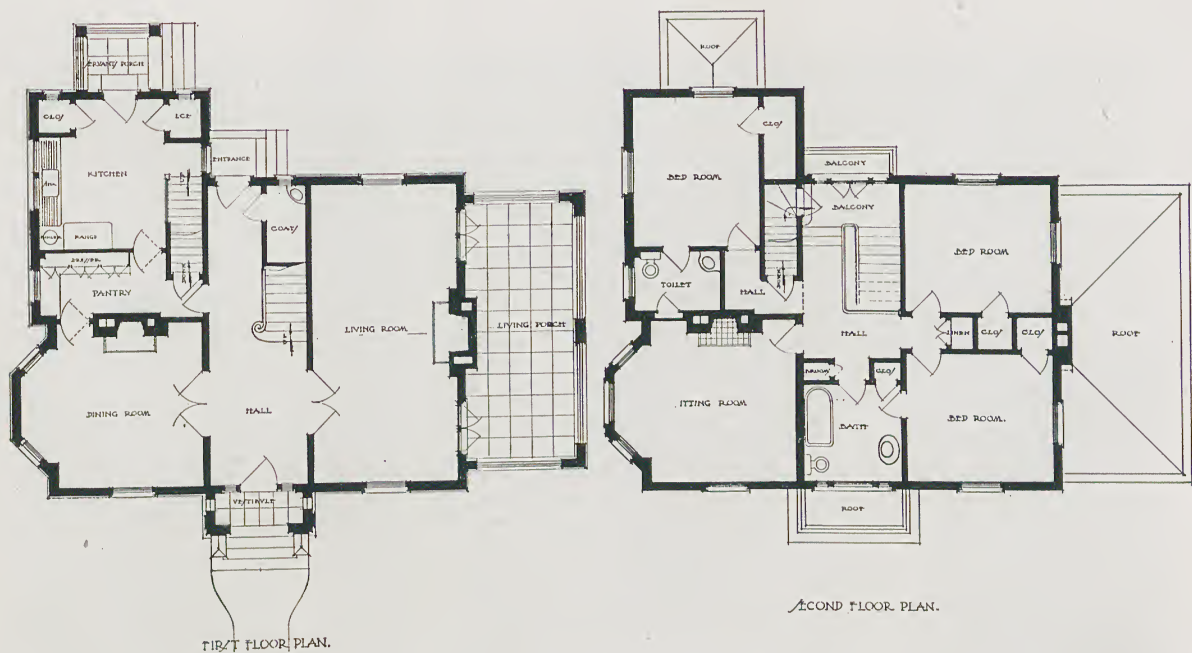
The above illustration is an example of the very pleasing effect which may be obtained by combining the use of brick and stucco for an exterior surface. The first story outside walls are constructed of brown velvet brick, backed up with eight inch Natco Hollow Tile. The second story walls are twelve inch Natco. The foundations are brick and the floors of wood construction. White pebble dash stucco was used with no waterproofing. The house measures 40 x 40 and has twelve rooms and two bathrooms, also a sleeping porch, sun parlor and lavatories in the basement and first floor. The roof is of black slate.



Residence at Cranford, New Jersey.

Hollingsworth & Bragdon, Elizabeth, Architects.

The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are twelve inch Natco and the floors are of wood construction. Cream white stucco was used with no waterproofing. The house measures 35 x 40 and has ten rooms and three bathrooms. The roof is of Spanish tile.



Floor plan of residence illustrated above.



Residence at Winnetka, Illinois.

Lawrence Buck, Chicago, Architect.

The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are concrete and the floors of wood construction. Rough cast white stucco was used with no waterproofing. The house measures 28 x 48 and has eleven rooms and three bathrooms. The roof is of shingle.



Residence at Newark, New Jersey.

William H. Bogart, Jersey City, Architect.

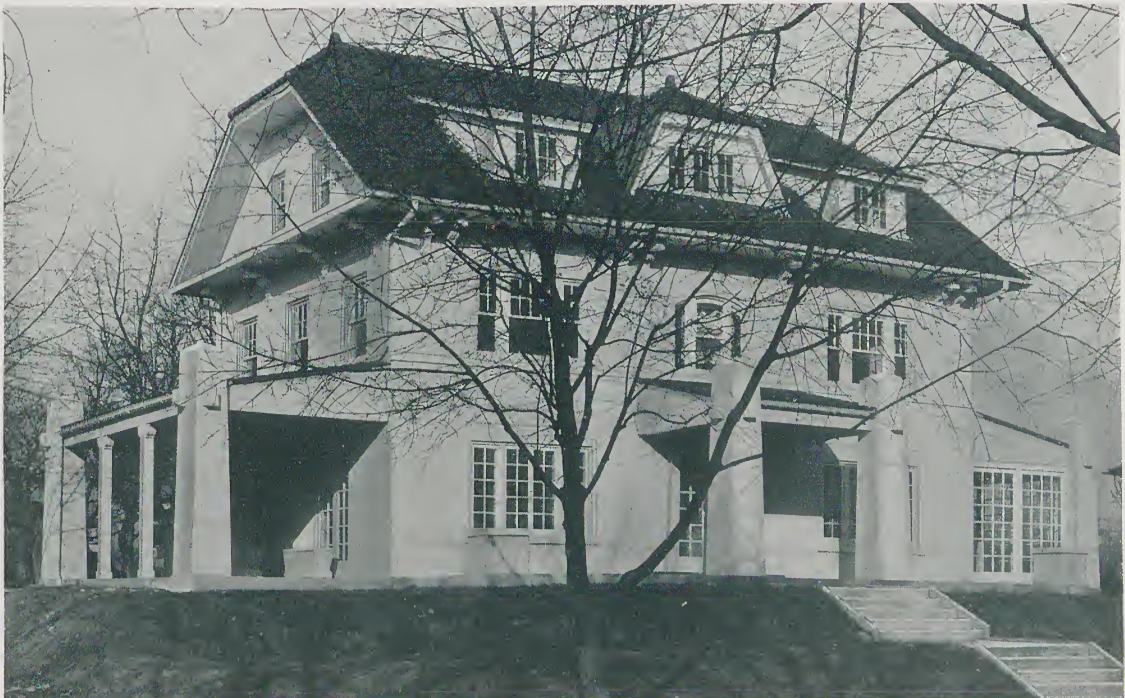
The outside walls of this house are constructed of ten inch Natco Hollow Tile. The foundations are Natco and the floors of wood construction. White stucco was used with a waterproofing compound. The house measures 38 x 43 and has twelve rooms and three bathrooms. The roof is of tile.



Residence at Newark, New Jersey.

Frederic Bigelow, Newark, Architect.

This is a thoroughly fireproof house throughout and is an example of the most advanced type of residence construction. The outside walls are constructed of ten inch Natco Hollow Tile. The foundations are brick, the floors of combination hollow tile and concrete and the partitions of hollow tile. White stucco was used with no waterproofing. The house measures 45 x 70 and has fourteen rooms and four bathrooms. The roof is of slate.



Residence at Mount Vernon, New York.

S. A. Guttenberg, Mount Vernon, Architect.

The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are stone and the floors of wood construction. White cement stucco and marble dust were used with no waterproofing. The house measures 37 x 42 and has ten rooms and three bathrooms. The roof is of Spanish tile.



Residence at Chicago, Illinois.

Marshall & Fox, Chicago, Architects.

The outside walls of this house are constructed of twelve and ten inch Natco Hollow Tile. The foundations are concrete and the floors of wood construction. Rough cast buff stucco was used with no waterproofing. The house measures 32 x 105 and has fifteen rooms and four bathrooms. The roof is of shingle. The garage is of similar construction.



Residence at Scranton, Pennsylvania.

B. Taylor Lacey, Scranton, Architect.

The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are concrete and the floors of wood construction. White stucco was used with no waterproofing. The house measures 32 x 52 including a side porch which is excavated and part of the cellar. There are twelve rooms and two bathrooms. The roof is of Spanish tile.



Residence at Eastern Point, Gloucester, Mass.

E. L. Phillips, Gloucester, Architect.

This is a thoroughly fireproof house throughout and is an example of the most advanced type of residence construction. The outside walls are constructed of eight inch Natco Hollow Tile. The foundations are stone, the floors of combination hollow tile and concrete and the partitions of four and six inch hollow tile. The stucco is white and when applied was mixed with a waterproofing compound. The house measures 32 x 92 and has sixteen rooms and five bathrooms. The roof is of slate laid on terra cotta book tile.



Residence at Normandy, St. Louis County, Missouri. W. E. Wischmeyer, St. Louis, Architect.

The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are concrete and the floors of wood construction. White rough cast stucco was used with no waterproofing. The house measures 44 x 52 and has fifteen rooms, three bathrooms and one lavatory. The roof is of tile.



Residence at Paterson, New Jersey.

Charles Edwards, Paterson, Architect.

The outside walls of this house are constructed of ten inch Natco Hollow Tile. The foundations are brick and the floors of wood construction. White stucco was used with a waterproofing compound. The house measures 42 x 50 and has eleven rooms and three bathrooms. The garage is of similar construction. The roof is of slate.



Residence at Pittsburgh, Pennsylvania.

C. E. Harvey, Chicago, Architect.

This is a thoroughly fireproof house throughout and is an example of the most advanced type of residence construction. The outside walls are constructed of twelve inch Natco Hollow Tile on the first story and eight inch Natco above. The foundations are stone, the partitions of tile and the floors of combination hollow tile and concrete. White stucco was used with no waterproofing. The house measures 25 x 33 and has ten rooms and one bathroom. The kitchen is built on in the form of an addition and is 15 x 15 and is also completely fireproof. The roof is of slate.



Residence at Orange, New Jersey.

Mann & MacNeille, New York, Architects.

This is a thoroughly fireproof house throughout and is an example of the most advanced type of residence construction. The first story outside walls are constructed of eight inch Natco Hollow Tile and the second story of six inch Natco. The foundations are concrete, the floors of combination hollow tile and concrete and the interior partitions of hollow tile. Gray stucco was used and when applied was mixed with a waterproofing compound. The house measures 22 x 66 and has ten rooms and two bathrooms. The roof is of slate.



Residence at Binghamton, New York.

Walter H. Whitlock, Binghamton, Architect.

The outside walls of this house are constructed of eight inch Natco Hollow Tile, and the middle partitions of six inch Natco. The foundations are concrete and the floors of wood construction. Gray stucco was used with a waterproofing compound. The house is a double one and measures 38 x 47, having eight rooms and one bathroom on each side. The roof is of slate.



Residence at Detroit, Michigan.

Louis Kamper, Detroit, Architect.

This is a thoroughly fireproof house throughout and is an example of the most advanced type of residence construction. The outside walls are constructed of twelve inch Natco Hollow Tile above the first floor line. The foundations are of second conduits and the floors of combination hollow tile and concrete. White rough cast stucco was used with waterproofing. The house measures 40 x 74 and has twenty-two rooms and four bathrooms. The roof is of slate. There is a garage in connection with this house measuring 22 x 32 which is of the same construction and finish as the house.



Residence at Millburn, New Jersey.

Ernest Greene and Lucius Clark Main, New York,
 Associate Architects.

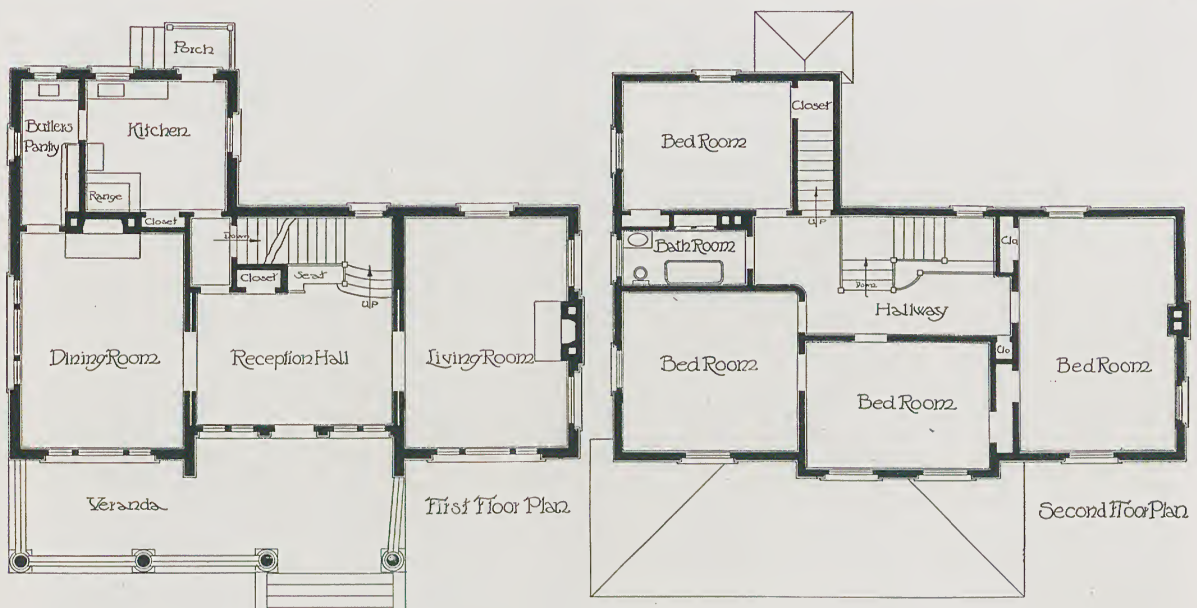
The outside walls of this house are constructed of Tapestry brick backed up with eight inch Natco Hollow Tile. The foundations are twelve inch Natco and the floors of wood construction. The house measures 32 x 47, has ten rooms, two bathrooms and an extra toilet. The roof is of moss green tile. A large closed veranda open to the rafters, with brick exposed inside, is one of the attractive features of this house.



Residence at Plainfield, New Jersey.

George Henry Fisher Jr., Plainfield, Architect.

The outside walls of this house are constructed of ten and eight inch Natco Hollow Tile. The foundations are Natco and the floors of wood construction. The stucco is light gray with no waterproofing. The house measures 34 x 50 and has eight rooms and one bathroom. The roof is of slate.



Floor plan of residence illustrated above.



Residence at (Longmeadow), Springfield, Mass. Kirkham & Parlett, Springfield, Architects.

This is a thoroughly fireproof house throughout and is an example of the most advanced type of residence construction. The outside walls are constructed of eight inch Natco Hollow Tile. The foundations are of brick and the floors of combination hollow tile and concrete. Buff stucco was used with no waterproofing. The house measures 45 x 100 and has sixteen rooms and four bathrooms. The roof is of red asbestos.



Assistant Surgeons Quarters, Marine Hospital, Clifton, S. I., New York. J. Knox Taylor, Washington, D. C., Supervising Architect.

The outside walls of this house are constructed of eight inch Natco Hollow Tile. The foundations are stone and the floors of wood construction. White stucco was used with a waterproofing compound. The house measures 40 x 60 and has eighteen rooms and four bathrooms. The roof is of shingle.

Various Types

of

NATCO HOLLOW TILE CONSTRUCTION



Chapin Home at Jamaica, L. I., New York.

Raymond Almirall, New York, Architect.

The above illustration shows a group of buildings known as the Chapin Home for The Aged. The construction throughout is thoroughly fireproof in every sense of the word. The outside walls are composed of a double thickness of Natco Hollow Tile. The foundations are concrete and the floors of combination hollow tile and concrete. Gray stucco was used and when applied was mixed with a waterproofing compound. The whole operation is forty feet wide with two wings each sixty feet long and one wing one hundred feet long. The pavilion measures sixty feet. There are seventy-five rooms in all and ten bathrooms. The roof is of slate.

This is a striking example of the unusual adaptability of the material for any and all forms of construction where the question of fire protection is a matter of first consideration.



Y. M. C. A. Building at League Island Navy Yard, Philadelphia, Pennsylvania.
Alexander M. Adams, Philadelphia, Architect.

This is a thoroughly fireproof building throughout and is an example of the most advanced type of construction for this class of building. The outside walls are mostly sixteen inch laid up with two eight-inch Natco Hollow Tile blocks. The foundations are concrete and the floors of combination hollow tile and concrete. Dark cement color stucco was used with no waterproofing.

It is worthy of note that this building was designed and built for the United States Government and is one of the strongest endorsements which can be offered of the growing use of Natco Hollow Tile for exterior wall construction in buildings up to five stories in height.



Hotel Princeton, Boston, Massachusetts.

John C. Spofford, Boston, Architect.

The outside walls of this building are constructed of Natco Hollow Tile. The first story walls are sixteen inch and the other stories are twelve inch Natco. The foundations are concrete and the floors of wood construction. Gray stucco was used with no waterproofing. The building measures 48 x 156 and has one hundred and fifteen rooms and forty-eight bathrooms. There is also a roof garden. The coping is of red tile.



Buckwood Inn, Shawnee-on-the-Delaware, Penn.

William A. Bates, New York, Architect.

This is a thoroughly fireproof building throughout in every sense of the word and represents the most advanced type of construction. The first story outside walls are constructed of ten inch Natco Hollow Tile and the second and third stories of eight inch Natco. The foundations are Natco and the floors of hollow tile and concrete. The stucco is natural gray with no waterproofing. The main building measures 45 x 300 with an extension of 40 x 100. There are one hundred and twenty bedrooms and twenty bathrooms. The roof is of red Spanish tile.

This is an exceptionally good example where an owner has realized the necessity of building a fireproof structure in order to eliminate the fear of fire which would necessarily be foremost in the minds of many residing in an isolated spot.



Apartment House at Roxbury, Massachusetts.

Fred. A. Short, Boston, Architect.

The outside walls of this house are constructed of twelve inch Natco Hollow Tile. The foundations are Natco with concrete footing and the floors of wood construction. Light rough cast stucco was used with no waterproofing. The building measures 39 x 70 and has thirty-nine rooms and six bathrooms. The roof is of tar and gravel.



Group of houses at Forest Hills, L. I., New York. Grosvenor Atterbury, New York, Architect.

The above illustration is an example of the very pleasing effect which may be obtained by combining the use of brick and stucco for an exterior surface. The outside walls of the first story are constructed of eight inch Natco Hollow Tile. The second story walls are brick on edge, veneered over four inch Natco with ribs of stucco on eight inch Natco. The foundations are concrete and the floors of wood construction. The stucco is gray. The houses measure 17 x 37 and 17 x 40. There are seven rooms and one bathroom. The roofs are of tile.

These houses are a part of a group built by the Sage Foundation Homes Company. Only the most advanced type of construction is being used in this work and the whole operation is already attracting a great deal of attention throughout the country.



Hotel at Jamaica, L. I., New York.

N. W. Hausmann, New York, Architect.

The outside walls of this building are constructed of twelve inch Natco Hollow Tile. The foundations are stone and the floors of wood construction. The stucco is light gray and when applied was mixed with a waterproofing compound. The building measures 80 x 80 and has eighty-five rooms and twenty-three bathrooms. The roof is of Spanish tile.

This is an example of the growing popularity of NATCO Hollow Tile for exterior wall construction in small hotels.



Engineers' Quarters, Richmond Terrace, West Brighton, S. I., New York. James Whitford, New York, Architect.

The outside walls of this house are constructed of twelve inch Natco Hollow Tile. The foundations are concrete and the floors of wood construction. The stucco is white and when applied was mixed with a waterproofing compound. The house measures 28 x 48 and has twelve rooms and two bathrooms. The roof is of red Spanish tile. The cost complete of this operation was approximately nine thousand dollars.



Lock Keeper's House on the Ohio River. Designed by U.S. Government Engineering Department.

The above illustration is one of twelve houses which have recently been built by the Government along the Ohio River. The first story walls are constructed of four inch brick tied to 4 x 5 x 12 Backup blocks. The second story and attic walls are constructed of eight inch Natco Hollow Tile with stucco finish. The house measures 28 x 38 and has seven rooms and one bathroom.

This is another one of the many examples where the United States Government has specified NATCO Hollow Tile and is the most convincing argument that can be offered for the growing popularity of this material for exterior wall construction.



Village Stores at Glen Ridge, New Jersey.

Boring & Tilton, New York, Architects.

The outside walls of this building are constructed of eight inch Natco Hollow Tile. The foundations are concrete and the floors of wood construction. Limestone buff stucco was used with no waterproofing. The building measures 52 x 150 and has six stores on the first floor and sixteen offices on the second, with nine toilets in all. The roof is of slag and tile.

Store Building at Milwaukee, Wisconsin. Harry C. Reely, Cincinnati, Ohio, Architect.

The outside walls of this building are constructed of twelve and eight inch Natco Hollow Tile. The foundations are concrete and the floors of wood construction. Light gray stucco was used with no waterproofing. The building measures 25 x 36 and beside the store on the first floor, has five rooms and one bathroom. The roof is of shingle.





Natatorium at Atlantic City, New Jersey. Amsterdam Fireproof Construction Company, Atlantic City, Architects & Builders.

The outside walls of this building are constructed of twelve inch Natco Hollow Tile, being thirty two feet in height. The foundations are concrete and the floors partially cement and partially wood. The stucco is a light cement effect and no waterproofing was used. The natatorium contains a large swimming pool with complete equipment.

This is an exceptionally good example of the growing use of Natco Hollow Tile for exterior wall construction in buildings of this type. The Natatorium is one of the show places of Atlantic City and is the largest of its kind in this section of the country.



Apartment at Paterson, New Jersey. Albert Federici, Paterson, Architect.

This is a thoroughly fireproof building throughout and is an example of the most advanced type of apartment construction. The outside walls are constructed of ten and eight inch Natco Hollow Tile. The foundations are concrete, the floors of combination hollow tile and concrete and the partitions of three inch hollow tile. The stucco is gray, and when applied was mixed with a waterproofing compound. The building measures 22 x 75, exclusive of rear porch, and has twenty-one rooms and three bathrooms. The roof has a slag finish.



Ilderan Outing Club, Rahway, New Jersey.

C. Godfrey Poggi, Elizabeth, Architect.

The outside walls of this club house are constructed of ten inch Natco Hollow Tile. The foundations are concrete and the floors of wood construction. White stucco was used with a waterproofing paint applied on the outside. The house measures 50 x 125 and contains a ball room, bowling alley, card rooms, billiard room, kitchen, boiler and coal room, committee rooms and toilet facilities. The veranda has a cement floor. The roof is of shingle.

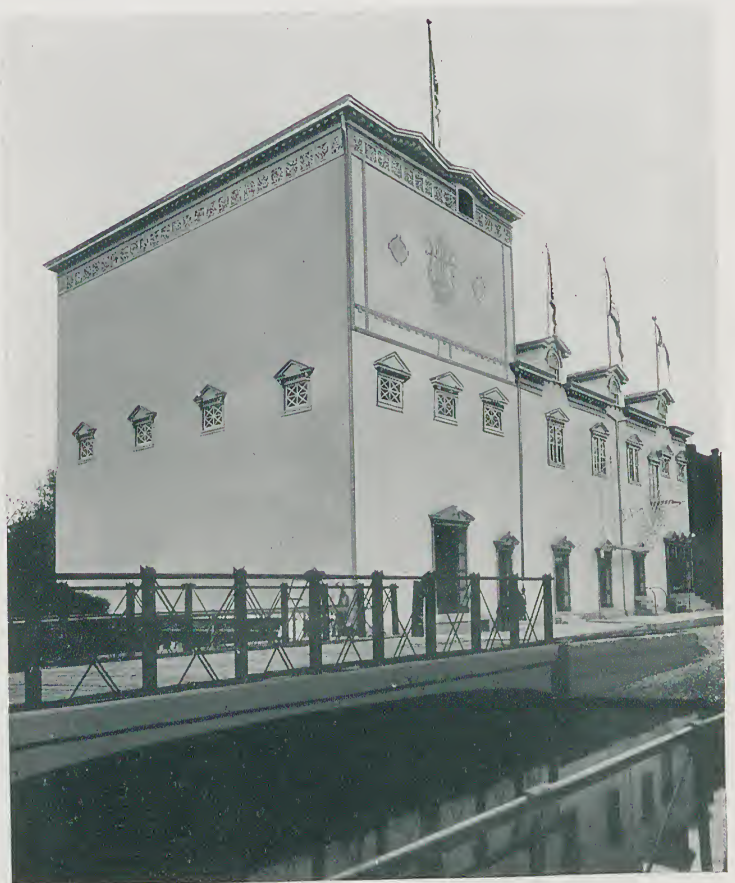
This is an example of the growing popularity of the use of Natco Hollow Tile for all types of exterior wall construction.

Shinnabrook Theatre, Chambersburg, Pennsylvania.

Franklin Guards Association,
 Owner. Private Plans.

The outside walls of this building are constructed of ten inch Natco Hollow Tile up to the balcony and eight inch Natco above. The foundations are concrete and the floors of wood construction. White stucco was used with no waterproofing.

The outside walls of this building are sixty five feet in height and illustrate very forcibly the strength and use to which Natco Hollow Tile may be put in abnormally high clear story walls.



Details of Construction

for

NATCO

HOLLOW TILE

FIREPROOF HOUSES

Our experts are at the service of the profession for consultation with regard to any or all details of construction.

We are glad to freely offer this service to Architects and Contractors as a means of furthering safe and economical methods for the use of our material.

Examples on preceding pages show clearly the scope of Natco Hollow Tile Construction—the beautiful as well as practical results made possible thereby.

The following pages show specific and graphic information as to the technical requirements of executing construction of this character.

These details can be readily applied to any work where the use of Natco Hollow Tile is contemplated.



Above is a photographic reproduction of a typical Natco Hollow Tile member. The visible points of superiority, as compared with similar Tile of different makes, are the deep dovetail scoring for the better bonding of stucco or plaster, the absence of imperfections and the better general symmetry due to the more accurate machining by this Company's unequalled equipment.

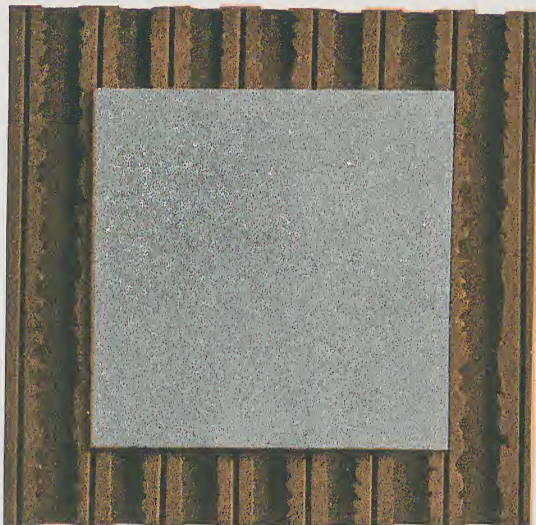
Equally important qualities not obtainable in other tile are not so apparent to the eye. These consist of finer properties in the raw clay and its more uniform and thorough burning, resulting in greater density and a higher degree of inherent strength.

It is to certify these advantages, and to instantly identify the tile possessing them, that the name Natco is stamped plainly upon the face of each tile.

Owing to the great demand for Natco Hollow Tile for use in foundation work, we are now manufacturing a special 9 hole 12 x 12 x 12 block as shown.

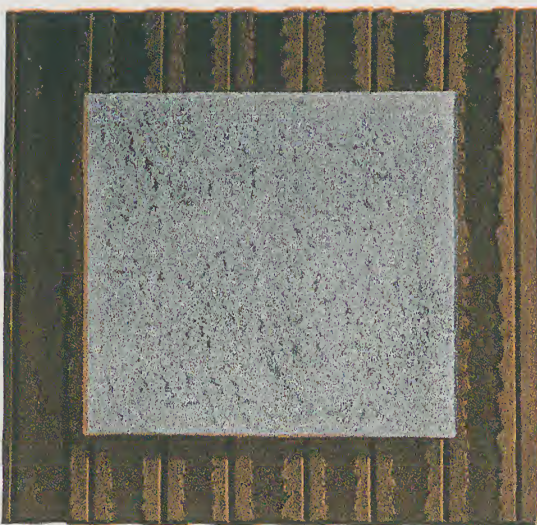
This block affords a triple air space, regardless of how it is laid up, and also gives added strength to the wall, on account of additional web area.





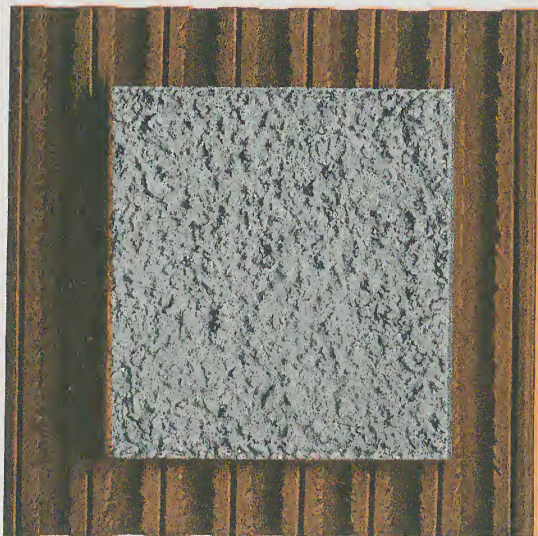
SAND FINISH

Composition of Portland Cement and Sand.



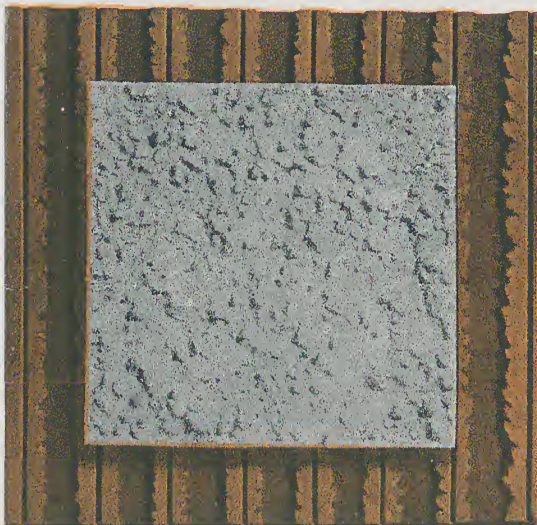
SAND FINISH STIPPLED

Composition of Portland Cement and Sand.



ROUGH CAST

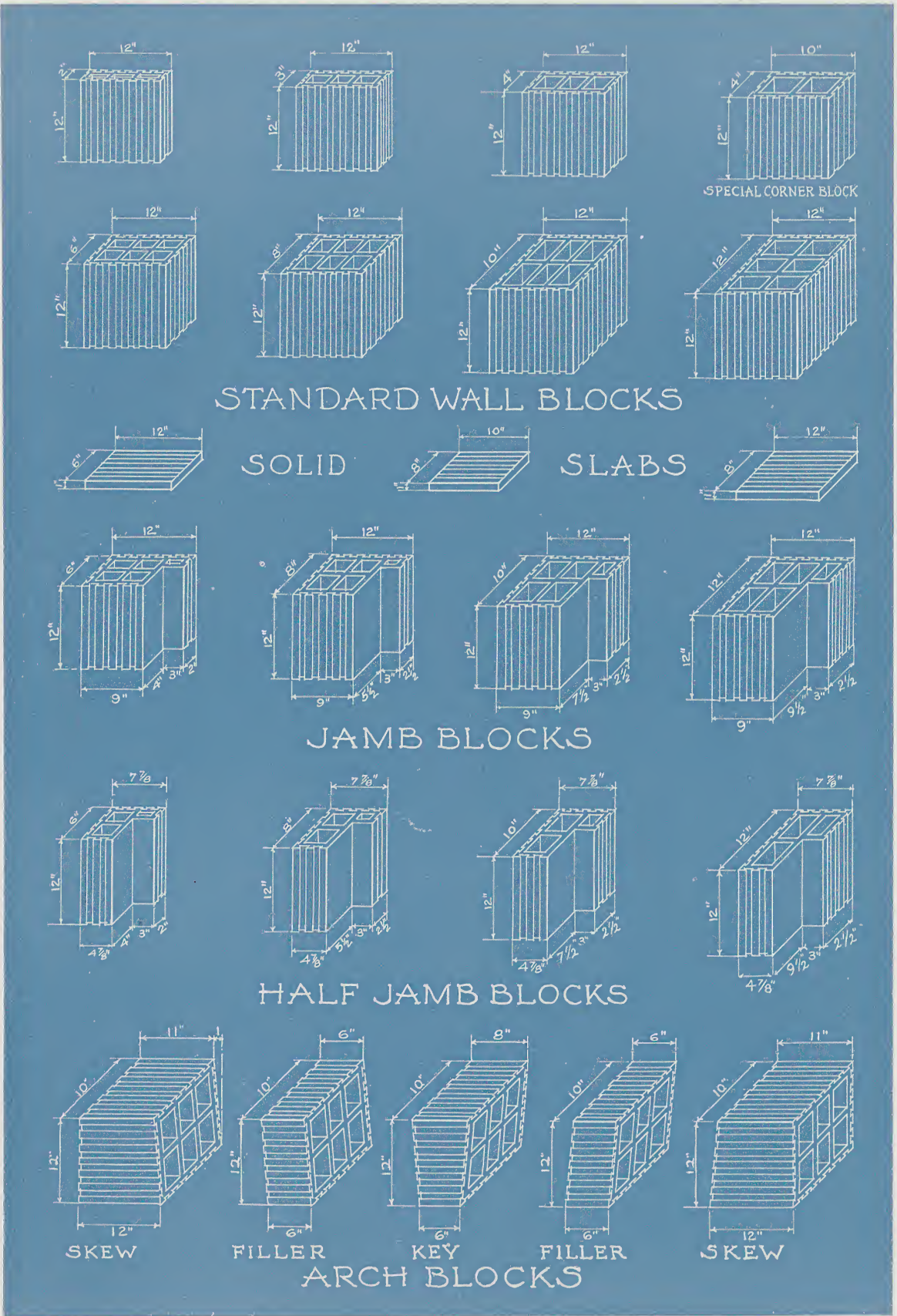
With Stone Screenings. Composition of Portland Cement, Sand and Stone Screenings.



PEBBLE DASH

Composition of Portland Cement and Sand with Pebbles Applied.

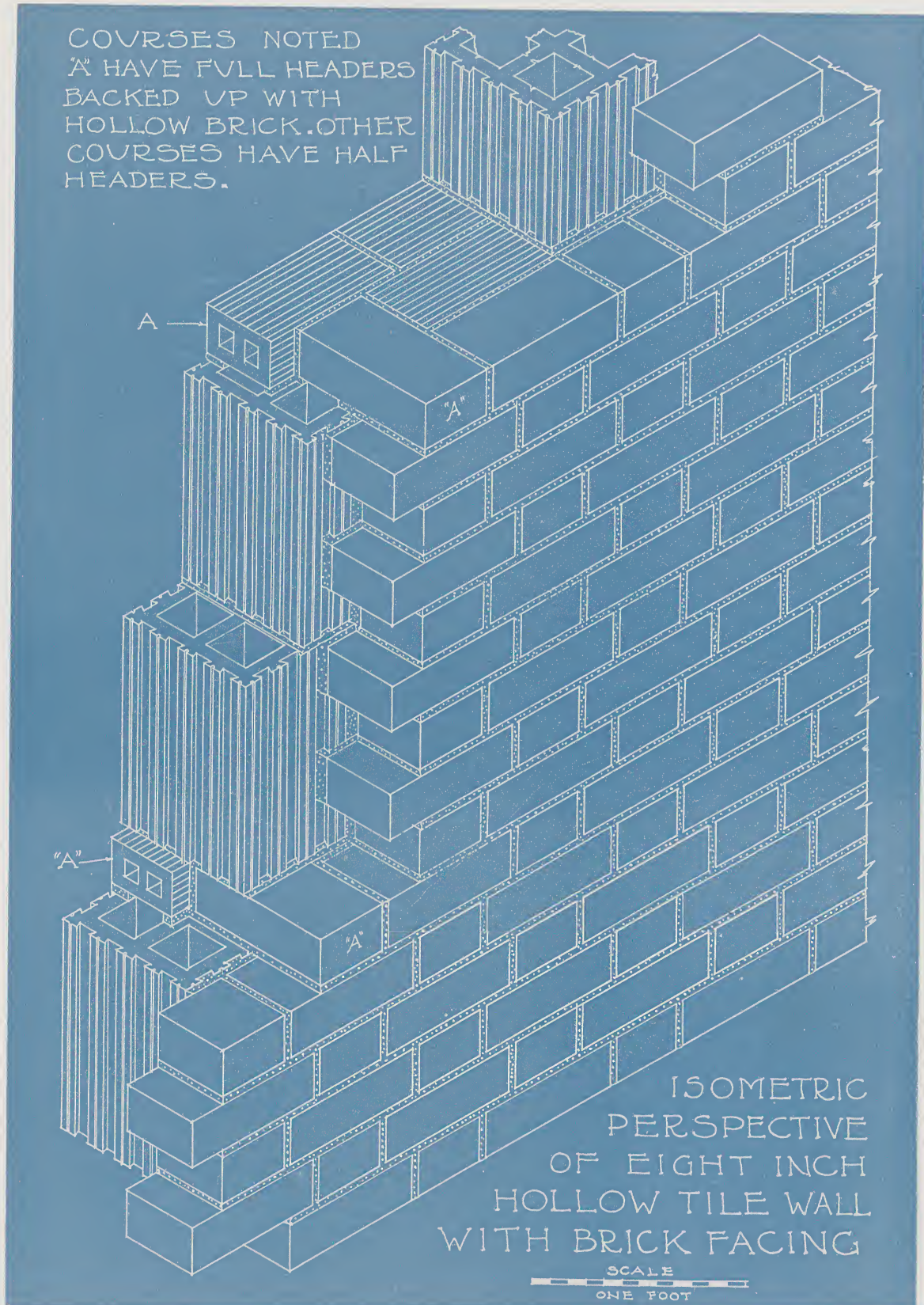
These are only a few of the various finishes that may be obtained in Stucco, as applied to Natco Hollow Tile wall construction.



Detail of Shapes and Sizes.

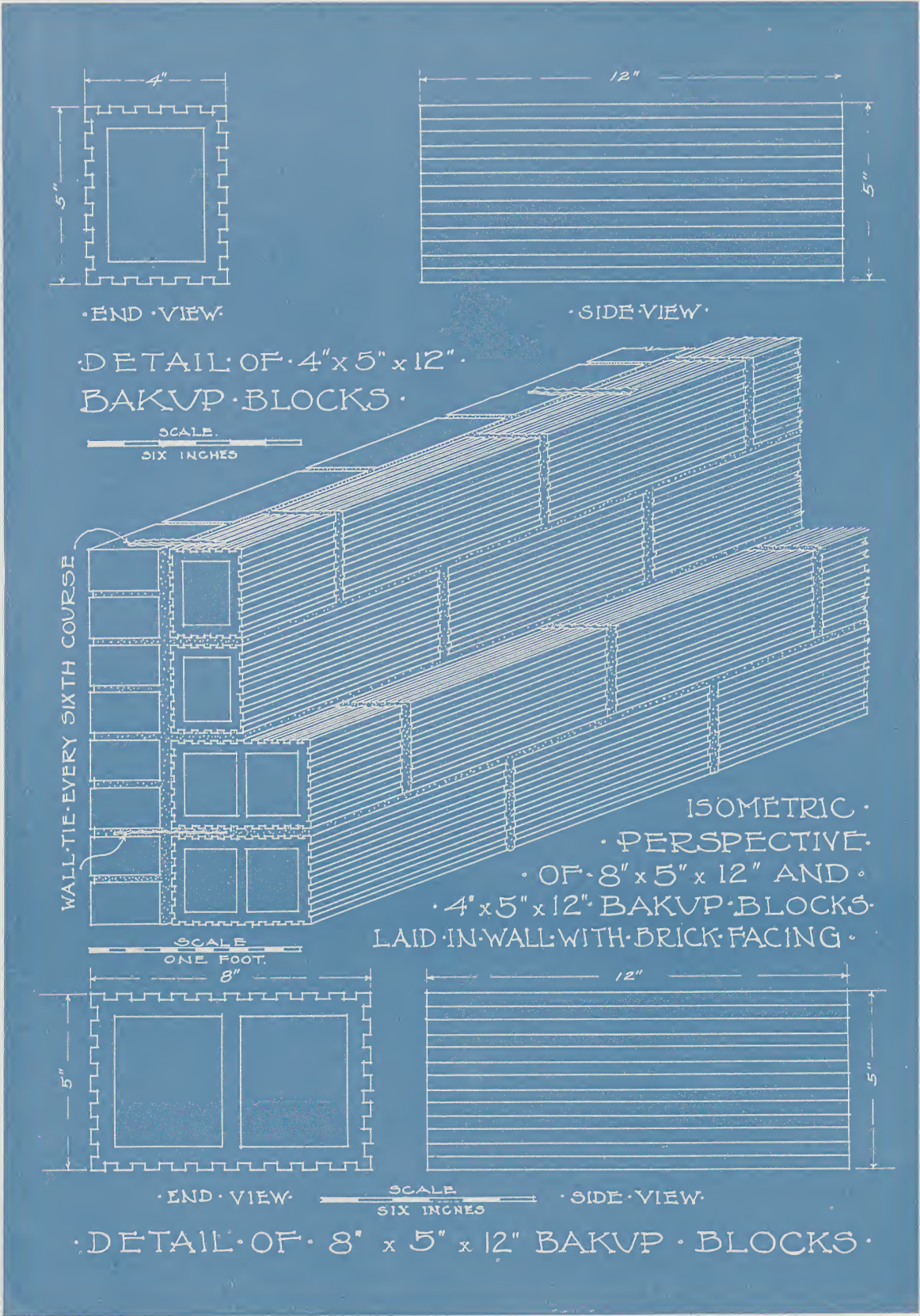
Jamb Blocks and Wall Blocks 4 inches thick and over are supplied in 6 inch and 3 inch heights. All estimates are made on a lump sum basis and the proper number of special shapes is furnished with each order.

Arches are made both of rabbetted and rectangular shapes and of 6 in., 8 in., 10 in. and 12 in. thickness. All bevels are 1 in. in 12 in. of height. Length of arch is varied by increasing number of inters. Key block to be placed as near center of arch as possible. The above shows rectangular arch blocks 12 in. thick.



Brick Veneer with Natco Hollow Tile Backing

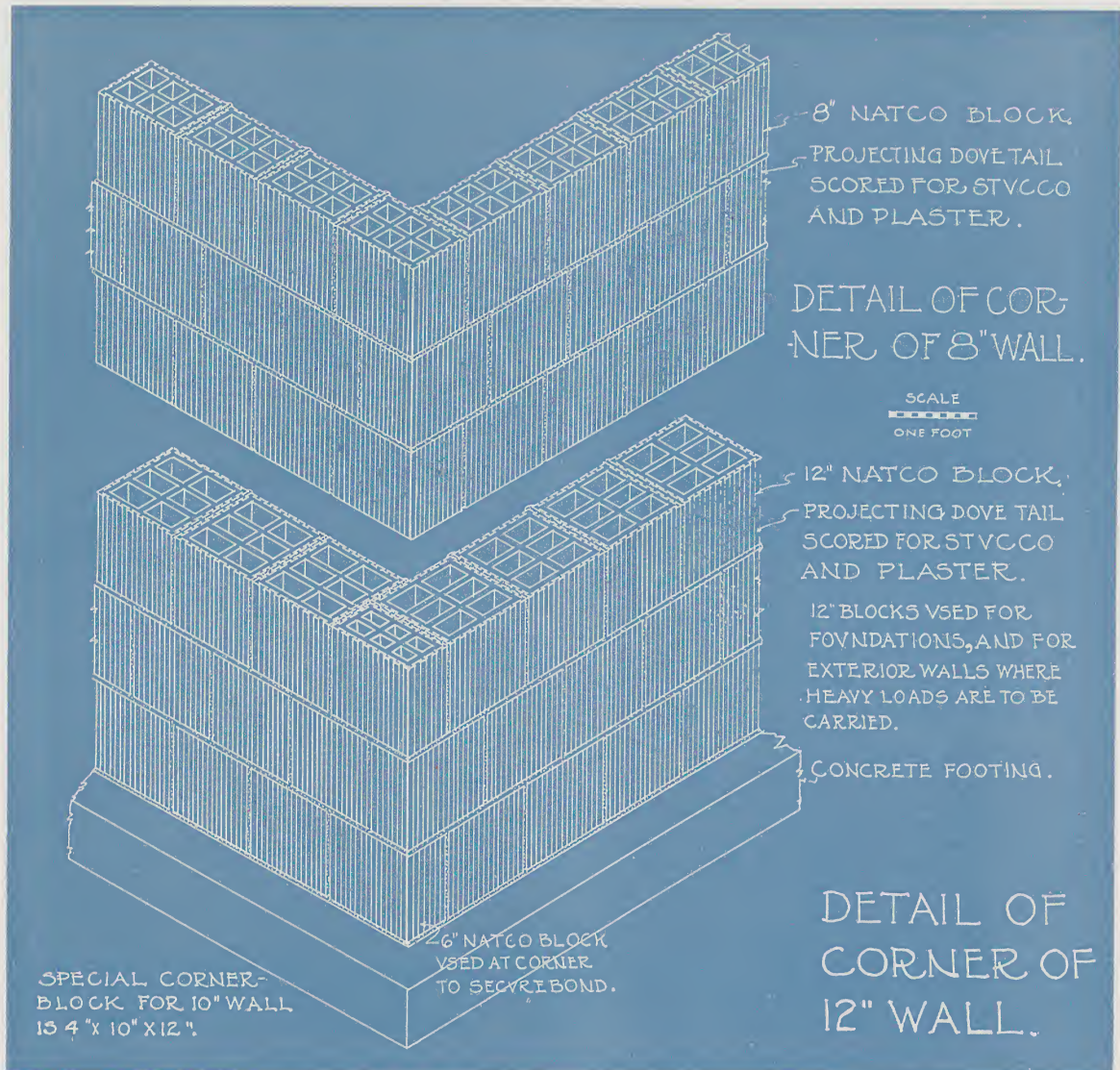
The above cut illustrates the method of backing up brick veneer with 8 x 12 x 12 Natco Hollow Tile. Every tenth course of brick is tied into the wall with a full header which is backed up with a row of hollow brick as shown in the drawing. All other courses have bats or half headers butting up against the block. This method of construction ties the tile and the brick in an absolutely rigid manner. A more common method of securing the brick veneer is by metal wall ties.



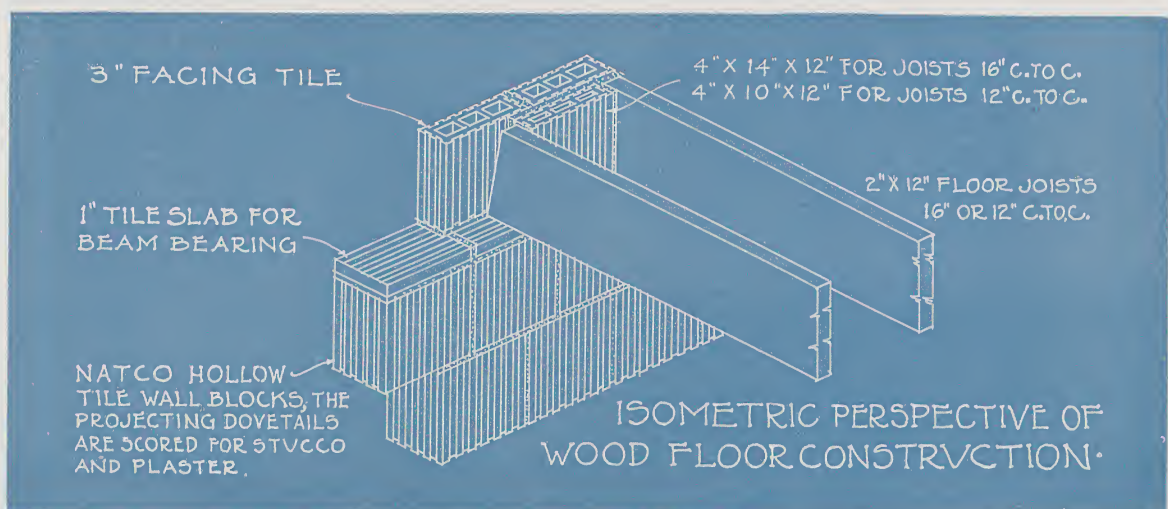
BAKUP BLOCK

Where a brick finish is desired, Hollow Tile is frequently used to back up the outside brick, thus affording the building the same fireproof and insulating value for the wall as in other Hollow Tile Houses.

For this purpose we make a specially designed block, known as the Backup Block, an illustration of the use of which is shown above. This block comes in two sizes, 5 x 4 x 12 and 5 x 8 x 12.

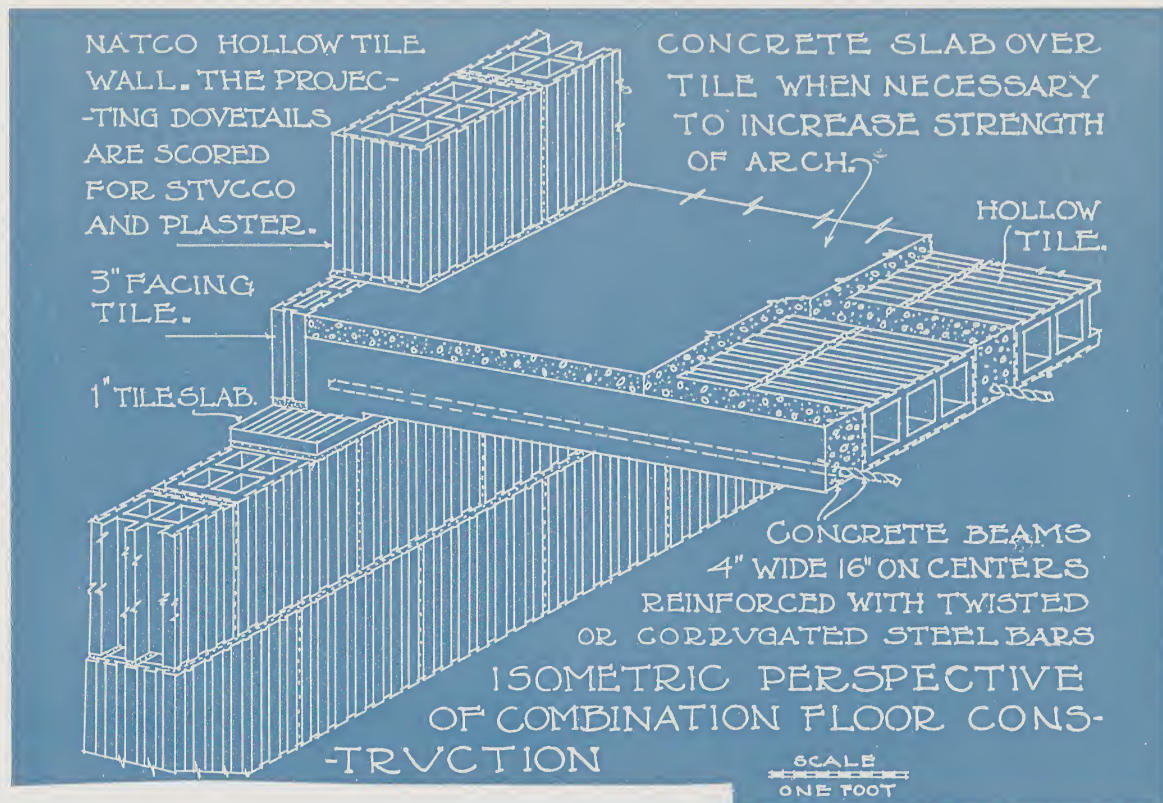


Detail of Foundation and Exterior Wall Construction



Detail of Wood Joist Construction

A building of the construction detailed above cannot be characterized as fireproof, except as to its walls. The walls, of course, give the superior insulating value of Tile construction, insuring a warm, dry interior in winter and a cool house in summer. They also permit plastering to be applied direct to tile wall without furring or lathing, making a further economy.

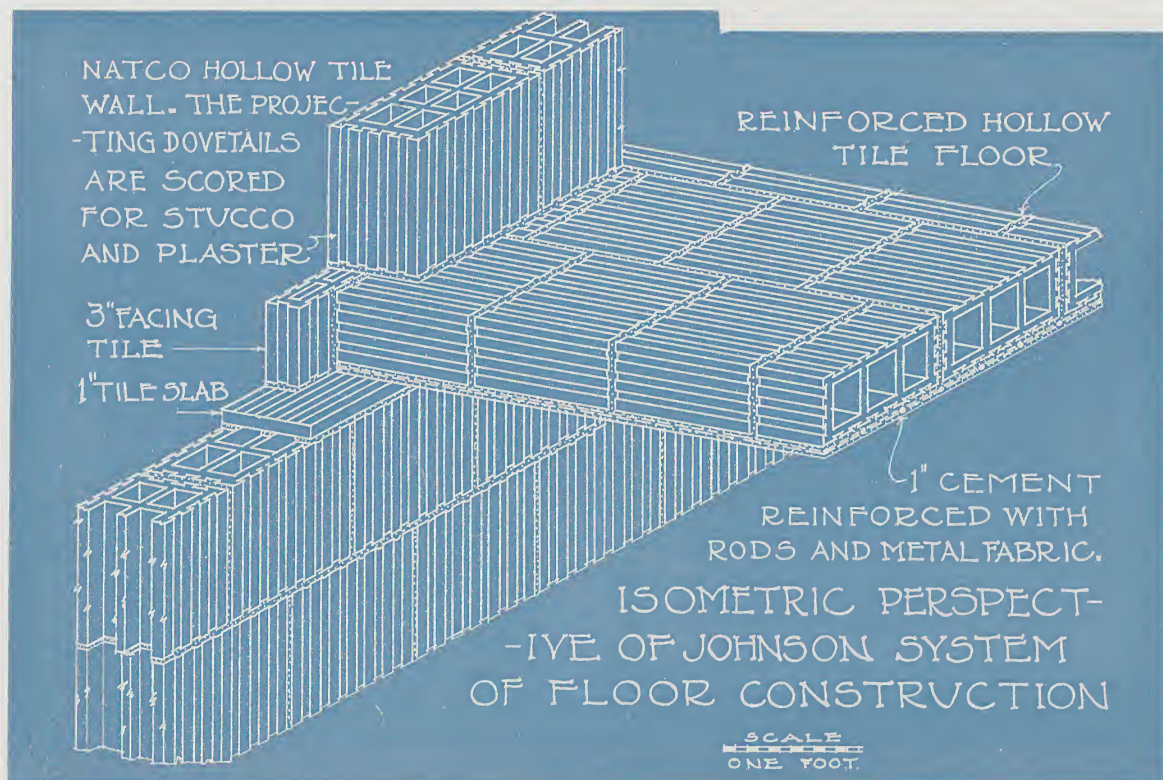


Detail of Combination Floor

Detail of wall Construction of Natco Hollow Tile with fireproof floor of Hollow Tile and reinforced concrete beams. This floor can be carried safely over very long spans, as shown in our Load Table on Page 60.

The ceilings may be left flat, ready to receive the plaster from the concrete. Beams may be dropped down 2 or 3 inches, as required, to give the beam ceiling effect so often desired in residences.

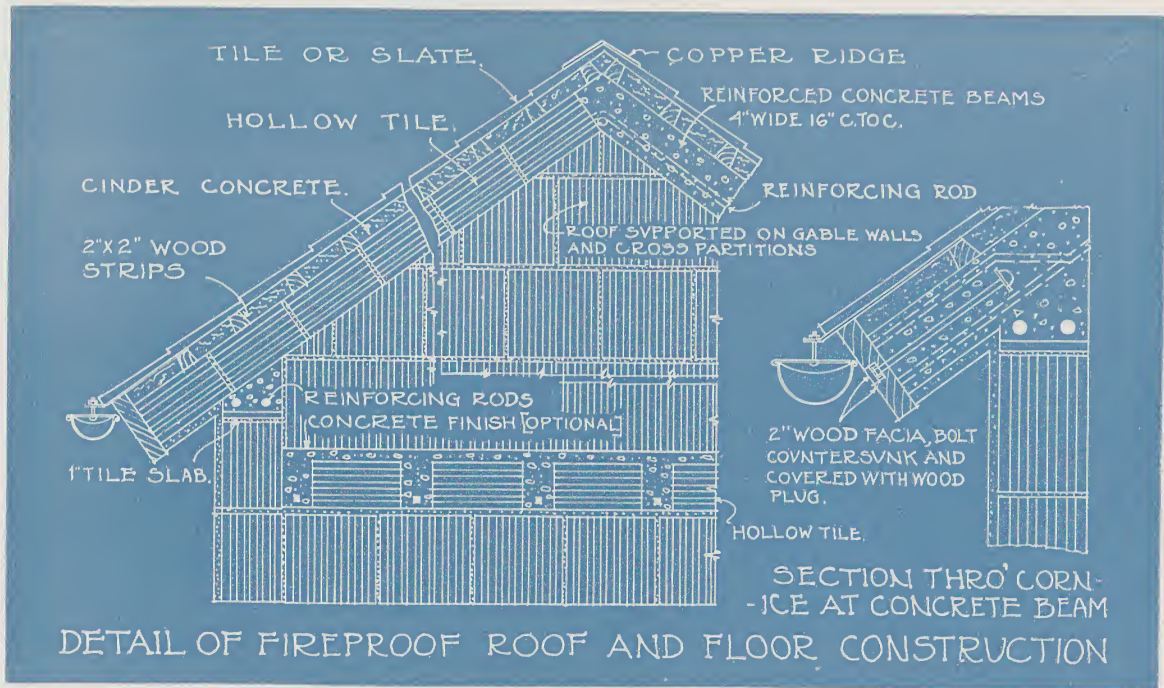
The Natco Hollow Tile can be furnished in half blocks in order to overcome story heights, so that any desired level for the floor may be obtained.



Detail of Johnson System Floor

The Johnson Floor has been used in spans up to 25 feet, with entirely satisfactory results in every way. It is constructed chiefly of Terra Cotta Hollow Tile Blocks, the standard fireproofing material, which cannot be molecularly damaged by fire.

This floor construction is the lightest fireproof floor on the market, and is especially adapted for house construction on account of its use in the construction of long span floors as shown in our Load Table on Page 61.

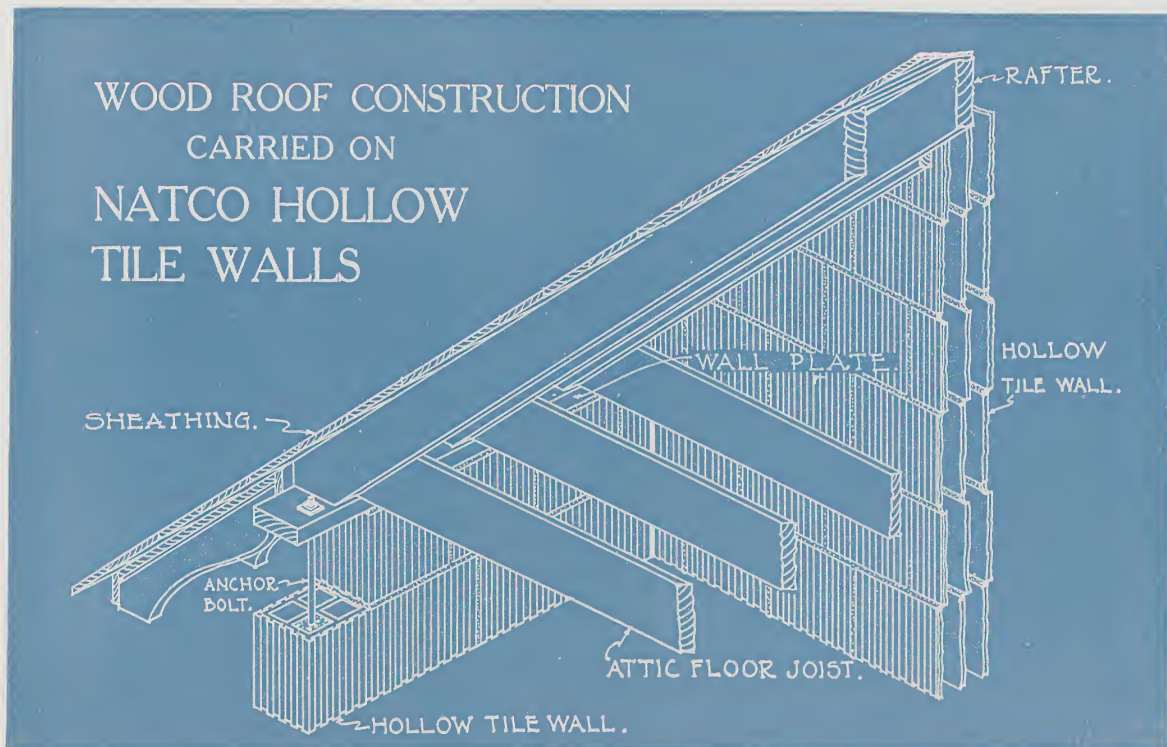


Detail of Fireproof Roof Construction

One of the difficulties which has appeared in the building of fireproof houses at moderate cost has been the securing of satisfactory roof construction. The problem has been to design a pitched or gable roof without the use of structural steel members. A flat fireproof roof could be readily designed without structural steel, but it would not be satisfactory to the architectural taste of all persons. The pitched roof using structural steel would considerably increase the cost of the building.

The plan shown above solves this problem most satisfactorily. It will be seen that the roof is of reinforced fireproof Hollow Tile construction similar to the floor construction shown on Page 56. This construction bears on the end or gable walls of the building and on cross partitions of tile built up solidly from the floor immediately below the roof. The entire roof load, therefore, is carried by the gable walls and cross partitions, and there is no load to act as a thrust on the side walls.

By the insertion of nailing strips or sleepers, as shown above, the finished roof either of slate, tile or composition, as may be desired, is readily laid.



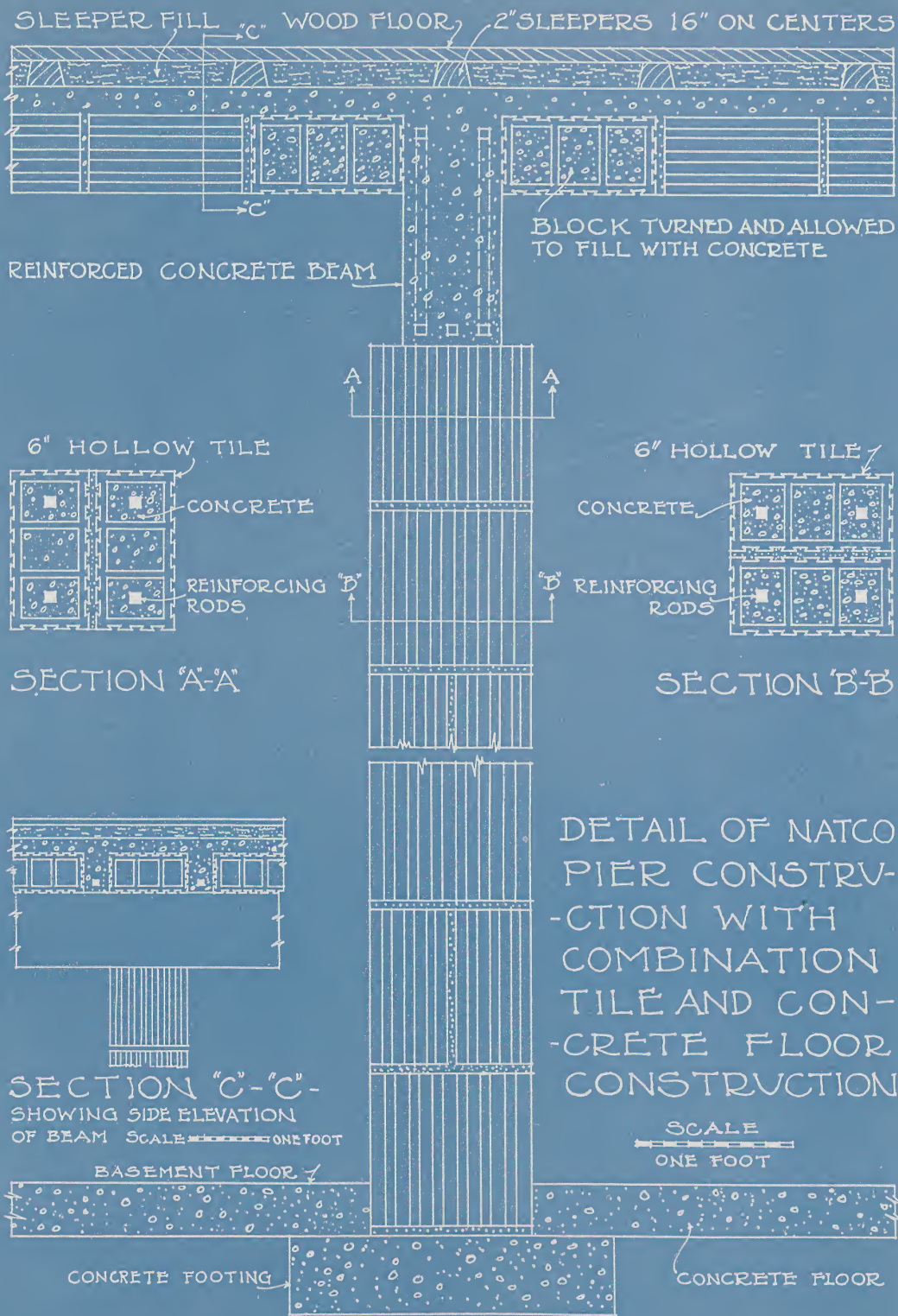
Detail of Wood Roof Construction

Note the method of anchoring the roof plate to the tile, also the method of carrying the wooden joists on the roof plate and bolting them to the roof timbers.

The anchor bolt should be about 30 inches long and spaced about 5 foot center to center. There should be a plate or hook at the lower end, the entire length of which should be embedded in cement mortar.

Joists and rafters should be well spiked to each other and also to the roof plate.

Shoe tile for steel lintels are furnished in two pieces to the block with special cuts for dividing on the job.

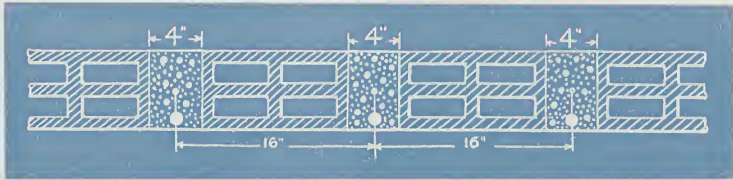


Detail of Pier Construction

Where partitions are not called for, as in cellars, it is necessary to carry the floors on girders, which are in turn carried on columns.

The column construction in such cases is detailed above. After the Hollow Tile is laid up in these columns, the reinforcing steel is placed and the concrete poured into the hollow spaces of the tile, as shown in the small detail drawing. This gives an extremely strong column, capable of carrying a far greater load than would be called for in the construction of residence buildings, and does away with the necessity for wooden centering for constructing columns.

SAFE LIVE LOADS in lbs. per sq. ft. for COMBINATION TILE FLOOR
without concrete top.

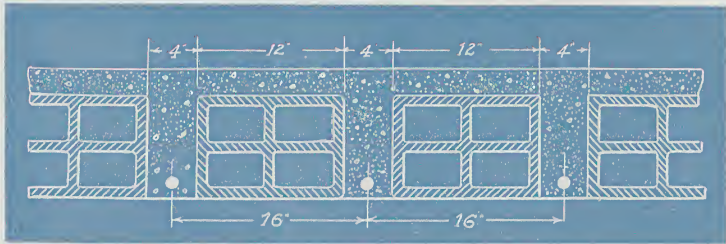


Composition of Concrete: 1 part Portland Cement—2 parts Sand—4 parts Stone or Gravel. Factor of Safety, 4.

SIZE OF TILE.

SPAN	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.	15 in.
5'-0"	82	162	262	388	540	...	...	...	...
6'-0"	49	103	170	257	360	482	...	...	...
7'-0"	29	68	115	177	252	340	438	...	...
8'-0"	...	45	79	125	181	248	322	499	...
9'-0"	...	29	54	90	133	185	242	380	...
10'-0"	...	...	37	65	99	140	185	295	506
11'-0"	...	...	24	46	73	106	143	232	404
12'-0"	...	...	...	32	54	81	110	184	326
13'-0"	...	...	...	...	39	61	86	146	266
14'-0"	...	...	...	...	27	46	66	117	218
15'-0"	...	...	...	...	...	33	50	93	179
16'-0"	...	...	...	...	...	...	37	74	148
17'-0"	...	...	...	...	...	...	26	57	121
18'-0"	...	...	...	...	...	...	...	44	99
19'-0"	...	...	...	...	...	...	...	32	81
20'-0"	...	...	...	...	...	...	...	22	65
Reinforced Steel in Each Rib	3/8" Sq.	3/8" Sq.	1/2" Sq.	1/2" Sq.	1/2" Sq.	5/16" Sq.	5/16" Sq.	5/8" Sq.	3/4" Sq.
Weight of Floor per Sq. Ft.	26 lbs.	30 lbs.	38 lbs.	43 lbs.	48 lbs.	52 lbs.	58 lbs.	68 lbs.	82 lbs.

SAFE LIVE LOADS in lbs. per sq. ft. for COMBINATION TILE FLOOR
with 2 in. concrete top.



Composition of Concrete: 1 part Portland Cement—2 parts Sand—4 parts Stone or Gravel. Factor of Safety, 4.

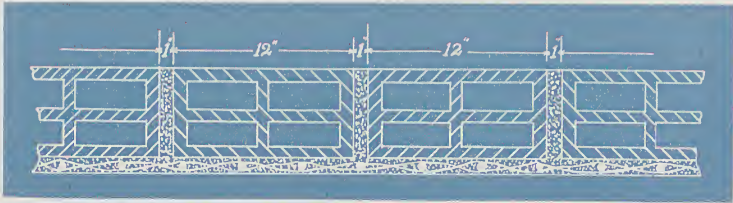
SIZE OF TILE.

SPAN	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.	15 in.
5'-0"	665	...	...	...	...	...	...	...	...
6'-0"	446	660	...	...	...	...	...	...	...
7'-0"	314	470	655	...	...	...	...	...	...
8'-0"	229	347	487	650	...	...	...	...	...
9'-0"	170	263	372	499	645	...	...	...	...
10'-0"	128	202	290	392	509	640	...	...	...
11'-0"	97	157	229	313	408	515	635	...	...
12'-0"	74	123	183	252	332	421	521	...	...
13'-0"	55	97	147	205	272	348	432	625	...
14'-0"	41	76	118	168	225	289	361	526	...
15'-0"	29	59	95	138	187	242	304	447	...
16'-0"	...	45	77	113	156	204	258	381	610
17'-0"	...	34	60	93	130	172	220	328	527
18'-0"	...	...	48	76	108	145	187	283	459
19'-0"	...	...	37	61	90	123	159	245	402
20'-0"	...	...	...	49	74	103	136	212	352
21'-0"	...	...	...	38	61	86	116	184	310
22'-0"	...	...	...	...	49	72	98	159	272
23'-0"	...	...	...	...	39	60	83	138	240
24'-0"	...	...	...	...	30	49	70	119	212
Reinforced Steel	5/8" Sq.	1 1/16" Sq.	3/4" Sq.	1 3/16" Sq.	7/8" Sq.	1 1/8" Sq.	1 1/8" Sq.	1 1/2" Sq.	1 3/8" Sq.
Weight of Floor per Sq. Ft.	50 lbs.	55 lbs.	60 lbs.	65 lbs.	70 lbs.	75 lbs.	80 lbs.	90 lbs.	105 lbs.

Above tables are figured for continuous span with the following stresses, which are very conservative:
500 pounds per square inch, extreme fibre composition in concrete.
16,000 pounds per square inch, tension in steel, (to be medium open hearth).
The end sheave and longitudinal sheave should be investigated, and sheave reinforcement provided when necessary.
NOTE—Designs made in accordance with the above table of loads will conform with the building laws of most large cities.
However a more economical design may often be obtained where building laws permit higher stresses.
Our Engineering Dept. is at the entire disposal of anyone desiring further information.



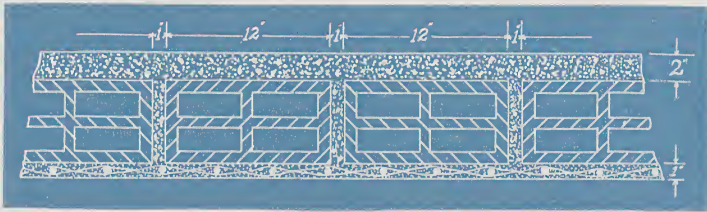
SAFE LIVE LOADS in lbs. per sq. ft. for JOHNSON SYSTEM FLOOR
without concrete top.



Safe Live Load in Pounds per Square Foot—Factor of Safety, 4.

SPAN IN FEET	12-in. Tile. 1/8-in. Dia. Rod. Weight of Floor per sq. ft., 55 lbs.	10-in. Tile. 1/8-in. Dia. Rod. Weight of Floor per sq. ft., 52 lbs.	9-in. Tile. 1/8-in. Dia. Rod. Weight of Floor per sq. ft., 48 lbs.	8-in. Tile. 1/8-in. Dia. Rod. Weight of Floor per sq. ft., 45 lbs.	7-in. Tile. 1/4-in. Dia. Rod. Weight of Floor per sq. ft., 42 lbs.	6-in. Tile. 1/4-in. Dia. Rod. Weight of Floor per sq. ft., 37 lbs.	5-in. Tile. 1/4-in. Dia. Rod. Weight of Floor per sq. ft., 35 lbs.	4-in. Tile. 1/4-in. Dia. Rod. Weight of Floor per sq. ft., 29 lbs.	3-in. Tile. 1/4-in. Dia. Rod. Weight of Floor per sq. ft., 27 lbs.
8	...	...	488	422	324	263	171	125	79
9	...	507	383	333	254	206	132	113	61
10	558	407	308	264	202	163	105	76	48
11	458	337	253	219	165	133	86	62	39
12	386	282	210	179	137	111	71	51	32
13	326	234	178	152	116	93	59	43	...
14	278	202	152	129	98	78	49	36	...
15	241	175	130	111	84	68	42	30	...
16	210	151	113	97	73	58	36	...	...
17	189	133	99	75	63	51	31	...	...
18	164	117	87	72	56	45	...	...	...
19	146	103	77	66	49	39	...	...	...
20	129	92	68	58	43	34	...	...	...
21	117	83	61	51	38	30	...	...	...
22	104	75	54	46	34	...	...	...	...
23	95	67	49	41	30	...	...	...	...
24	86	61	44	37	...	...	...	...	...
25	77	55	39	...	...	...	...	...	...

SAFE LIVE LOADS in lbs. per sq. ft. for JOHNSON SYSTEM FLOOR
with 2 in. concrete top.



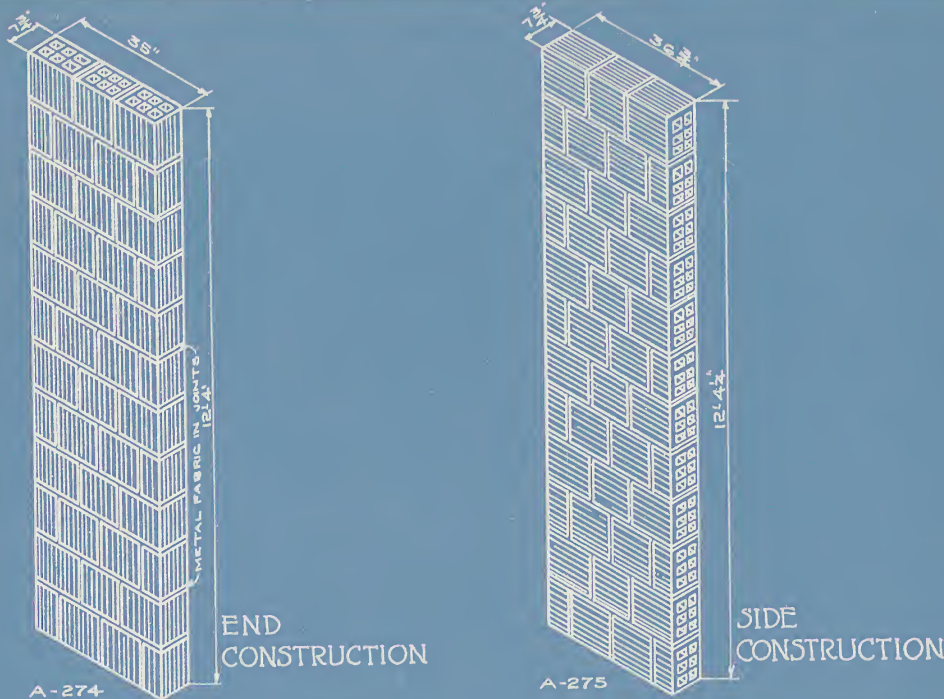
Safe Live Load in Pounds per Square Foot—Factor of Safety, 4.

SPAN IN FEET	12-in. Tile. 1/8-in. Dia. Rod. Weight of Floor per sq. ft., 79 lbs.	10-in. Tile. 1/8-in. Dia. Rod. Weight of Floor per sq. ft., 77 lbs.	9-in. Tile. 1/8-in. Dia. Rod. Weight of Floor per sq. ft., 72 lbs.	8-in. Tile. 1/8-in. Dia. Rod. Weight of Floor per sq. ft., 69 lbs.	7-in. Tile. 1/4-in. Dia. Rod. Weight of Floor per sq. ft., 66 lbs.	6-in. Tile. 1/4-in. Dia. Rod. Weight of Floor per sq. ft., 62 lbs.	5-in. Tile. 1/4-in. Dia. Rod. Weight of Floor per sq. ft., 59 lbs.	4-in. Tile. 1/4-in. Dia. Rod. Weight of Floor per sq. ft., 54 lbs.	3-in. Tile. 1/4-in. Dia. Rod. Weight of Floor per sq. ft., 51 lbs.
8	...	...	...	...	...	...	...	567	437
9	...	...	...	...	...	...	568	442	342
10	...	...	...	...	...	530	435	354	272
11	...	...	...	...	514	435	355	292	224
12	...	...	572	508	429	365	298	242	187
13	...	568	487	428	364	310	255	204	157
14	...	491	417	368	311	265	215	174	133
15	540	421	362	318	269	230	185	151	115
16	470	368	317	278	236	200	162	132	100
17	415	326	277	243	207	175	142	114	86
18	368	287	245	215	182	155	125	100	76
19	325	251	219	190	161	137	110	89	67
20	292	228	195	170	146	121	98	78	59
21	265	206	175	153	129	108	88	70	52
22	238	185	160	139	116	97	78	63	...
23	218	168	143	125	105	88	70	27	...
24	196	153	130	114	95	80	63	...	...
25	178	138	118	103	86	72	58	...	...

NOTE—Attention is called to the fact that this construction is reinforced in both directions. The reinforcing rods (shown in detail drawing page 56) take the direct strains. The transverse strains are taken by a woven metal fabric running lengthwise of the arch and through this fabric the rods are interwoven at intervals of four inches.

The above table is approximate and should be used for estimating only.





A-274 OBSERVED AND CALCULATED RESULTS					
TIME	GAUGE READING IN TONS 2000 LBS.	AREA IN COMPRESSION 80 SQ. INCHES		HORIZONTAL DEFLECTION AT CENTER OF SECTION IN INCHES.	COMPRESSION OF SECTION IN INCHES.
		ACTUAL LOAD ON WALL SECTION LBS.	ACTUAL LOAD IN LBS. PER SQ. IN. ON NET AREA OF TILE IN COMPRESSION		
P.M.	2	0	0		
11:00	3	2000	25	.000	.000
11:01	5	6000	75	.000	.004
11:03	10	16000	200	.000	.017
11:09	15	26000	325	.000	.031
11:12	20	36000	450	.000	.042
11:14	25	46000	575	.000	.053
11:16	30	56000	700	.000	.065
11:18	35	66000	825	.000	.076
11:20	40	76000	950	.000	.079
11:22	45	86000	1075	.005	.087
11:24	50	96000	1200	.005	.096
11:26	55	106000	1325	.005	.105
11:28	60	116000	1450	.005	.113
11:30	65	126000	1575	.015	.122
11:32	70	136000	1700	.020	.131
11:34	75	146000	1825	.050	.150
11:36	79	154000	1925	.100	
REMARKS BUILT APRIL 9-1912 TESTED MAY 7-1912 AGE 28 DAYS					
FAINT SOUNDS					
FAINT SOUNDS					
JOINT OPENED IN SECOND COURSE FROM BOTTOM.					
FAINT SOUNDS					
SHARP SOUNDS					
FAILURE					

FAILED AT 154,000 LBS. BY CRUSHING AND SPALLING AT 5TH, 7TH, 9TH AND 10TH COURSE FROM BOTTOM. SHOWED VERTICAL CRACKS AT CENTER OF WIDTH ON BOTH SIDES.

A-275 OBSERVED AND CALCULATED RESULTS					
TIME	GAUGE READING IN TONS 2000 LBS.	AREA IN COMPRESSION 80 SQ. INCHES		HORIZONTAL DEFLECTION AT CENTER OF SECTION IN INCHES.	COMPRESSION OF SECTION IN INCHES.
		ACTUAL LOAD ON WALL SECTION LBS.	ACTUAL LOAD IN LBS. PER SQ. IN. ON NET AREA OF TILE IN COMPRESSION		
P.M.	2	0	0		
2:48	3	2000	25	.000	.000
2:55	5	6000	75	.000	.000
2:57	10	16000	200	.015	.021
2:59	15	26000	325	.020	.041
3:01	20	36000	450	.020	.055
3:03	25	46000	575	.020	.075
3:05	30	56000	700	.020	.087
3:07	35	66000	825	.020	.103
3:09	40	76000	950	.020	.114
3:11	42	80000	1000	.045	
REMARKS BUILT APRIL 9-1912 TESTED MAY 7-1912 AGE 28 DAYS					
SLIGHT SOUNDS					
SLIGHT SOUNDS					
FAILURE					

FAILED AT 80,000 LBS. BY CRUSHING THE FULL WIDTH OF THIRD COURSE OF TILE FROM BOTTOM OF WALL.

CONSTRUCTED AND TESTED UNDER THE DIRECTION AND SUPERVISION OF ROBERT W. HUNT & COMPANY, TESTING ENGINEERS.

SIGNED Robert W. Hunt

Comparative Test of End and Side Construction

SPECIFICATION SHEET for ERECTING NATCO HOLLOW TILE

GENERAL:—Provide and erect all the Natco Hollow Tile exterior walls, interior bearing partitions, subdividing partitions, etc., as shown on the plans. All material must be hard burned, true and regular in size and shall have all faces scored with special dove-tail scoring to offer a good surface for the stucco finish. Blocks badly cracked or broken on the outside shells will not be acceptable under this specification. In general the terra cotta blocks must be Natco Hollow Tile manufactured by the National Fire Proofing Company.

LAYING:—All blocks used in the exterior walls and interior bearing partitions, must be laid with the holes or cores vertically in the wall, in order to develop their full strength. Interior subdividing partitions may be laid on the side if desired.

MORTAR:—All mortar used for laying up the Terra Cotta Blocks shall consist of a standard Portland cement and clean sharp sand in the proportion of one part cement to three parts sand, well mixed to a smooth, moderately stiff mortar. Lime, well slaked and not to exceed 10 per cent of the mass, by volume, will be allowed in the mortar.

FOUNDATION WALLS:—Where so indicated on plans, the foundation walls from top of footings to the under-side of the first floor beams should be constructed of 9-hole 12 x 12 x 12 Natco Hollow Tile Blocks. Care should be taken at the corners to use 6 x 12 x 12 blocks to secure a running bond in the wall. Outside of walls from footings to a point above the ground should be given a heavy coat of water-proof cement plaster.

Where columns or piers supporting heavy loads rest on the foundation wall the same will be filled with concrete from footing to top of wall to prevent the possibility of failure due to compression.

EXTERIOR WALLS AND BEARING PARTITIONS:—Exterior walls and partitions will be of thickness shown on the plans and must be in accordance with the foregoing conditions of quality, etc.

SUB-DIVIDING PARTITIONS:—Sub-dividing partitions will be of hard burned Terra Cotta Blocks, with a percentage of full porous blocks for nailing purposes. All partitions must be started on the structural floor and wedged against the floor arch above.

JAMB BLOCKS:—Provide for all hung windows, special Jamb Blocks with rabbetted opening, to receive the window frame box. Fill well with mortar the space between the blocks and the frame box to prevent the passage of air or moisture through same.

LINTELS:—Construct the lintels over all openings using steel LS—or with special Lintel Blocks reinforced with steel bars and concrete, as per detail shown on plans. Care must be taken not to bulge the lintels outward when placing the concrete.

SILLS:—Form all sills of Natco Hollow Tile sill block. Care must be taken to fill all joints so as to prevent moisture working through the same.

ARCH OPENINGS:—Build all arched openings shown on the plans of two course rowlock common or hollow brick header arches, carefully laid on substantial centers. Arches will spring from the Terra Cotta Block and must be well bedded on same.

PORCH COLUMNS AND PIERS:—Construct the porch columns and piers, sizes as shown, of Hollow Terra Cotta Blocks. Where column finish is round, build same of 3 inch round Hollow Terra Cotta column covering, filling the same with concrete where the second story walls are supported by them. Square columns will be built of the proper size wall tile.

FLOOR BEAM BEARINGS:—Provide and set terra cotta slabs 1 inch thick under all floor beams as bearing plates for same. These slabs will also be used for working up to levels and story heights when the full or half blocks do not work out correctly.

ROOF PLATES:—Embed at intervals of five feet in the wall under the roof plate, three quarter inch bolts 30 inches long with nut and washers and projecting 6 inches above the top of wall, to allow of the plate being fastened down. Fill around bolts with cement grout before placing roof plate. One inch slabs should be placed on the tile course directly below bolts.

Floor Construction

GENERAL:—Floor construction will be of the type known as the Combination Hollow Tile and concrete floor arch construction, consisting generally of 4 inch reinforced concrete beams spaced 16 inches on centers with Hollow Tile Blocks between, all to have at least 4 inch bearing on walls.

CONCRETE:—All concrete used in floor arches will consist of one part Portland cement, two parts clean sharp sand, and four parts broken stone or gravel of such size as will pass through a three quarter inch ring. Concrete will be of wet mixture and must be well tamped and worked around reinforcing steel after pouring.

REINFORCED STEEL:—Steel rods for floor construction must be of such type as will offer a mechanical bond with the concrete. Corrugated, twisted or similar type will be acceptable. Steel must have an elastic limit of not less than one-half the tensile strength. Rods must be clean and free from rust scales before placing in position and must be placed not over 1 inch above bottom of floor.

TILE:—Depth of tile filler blocks will be regulated by span and load to be carried and will be of size indicated on the plans. All blocks will be wet before concrete is placed so as to insure a good bond with the concrete.

CENTERS:—Centers must be of such size to insure of their not deflecting under the weight of the wet concrete, and must be provided in such quantity as to insure of speedy work. Care must be taken not to remove the centers before the concrete is hard, and under long spans a center line of supports must be maintained for at least three weeks after the concrete has been poured. In cold weather the centers must be left in place until directed by the Architect to remove them.

Specification Sheet for Stucco

STUCCO FINISH:—Stucco work will be two coat throughout. Tile to be thoroughly wet before applying first coat of stucco. Scratch coat will be at least one-half inch thick outside of tile surface, and will consist of one part Portland cement, three parts sand, with not more than 10 per cent lime putty. First coat will be applied under pressure and must be well scratched before it sets. Finish coat will be one quarter inch thick and for cement color finish will consist of one part cement and two parts clean sand.

MEMORANDUM AND GENERAL INFORMATION:—For white finish use white cement and white sand or marble dust. Buff or yellow finish may be secured by the use of yellow ochre. Lamp black added to the cement and sand will provide a dark tone if desired.

In the use of any coloring material, be sure to use only the best mineral pigments. For a rough sand finish the float is covered with burlap and finish coat should be quite dry. Dash finish is secured by throwing the mortar for the second coat on the walls with a wooden paddle. For pebble dash finish, the mortar should be rather wet when placed on the wall, after which the pebbles are thrown against it.

Stucco may be made waterproof by the addition of one of the many damp-proofing compounds now found on the market.

Careful mixing and workmanship will insure a good finished work. In warm weather precautions must be taken to prevent the stucco drying out too quickly. This may be prevented by spraying the walls once or twice a day for several days after applying the finish coat.

COMPARISON OF COSTS

The question of cost of construction is usually a controlling factor with the prospective house builder. This is equally true whether he builds as an investment or to secure a home.

Few builders realize, however, that variations in the cost of different houses are caused chiefly by differences in what may be termed the "superficial parts" of the building.

The point involved is simply this: Jones and Smith both desire a brick walled, stone front house of exactly the same size, same ground area, same height, same number of floors, same dimensions as to width and length, same number of rooms arranged in the same manner.

So far, both using the same quality of materials and the same amount of labor, it is evident that the cost of both houses will be practically equal for the basic structure, i. e., the foundations, walls, floors, roofs and partitions. It is also apparent that up to this point one house is exactly the same as the other.

Now they part company. Jones wants mahogany wood work throughout. Smith is happy with birch. Jones wants several stained glass windows; Smith is willing to have clear glass throughout. Jones wants library walls of burlap with painted decorative panels; Smith is satisfied with a tinted plaster, wall etc., etc., The result is that Jones' house complete costs, say, fifty thousand dollars, and Smith's costs only ten thousand. Yet both buildings, so far as their actual structural parts are concerned, are exactly identical and cost the same amount.

In connection with fireproof construction, these points are especially appropriate. The cost of Natco Hollow Tile is the same whether used for the millionaire's residence or for the clerk's. The cost per square foot to set it is the same. The one building can readily be made as durable, substantial and free from fire danger as the other.

Only where the dimensions and the "superficial parts" of the building are different, does the necessity arise for the need of the longer purse.


The figures given below, which are, of course, purely approximate, are of interest in this connection.

Comparative building costs of different systems of building, based upon an average frame dwelling costing \$10,000.00 complete, located in the vicinity of New York:

- (a) \$10,000 Frame.
- (b) \$11,200 Face Brick outside walls, wooden inside.
- (c) \$11,000 Face Brick outside walls, backed up with Natco Hollow Tile.
- (d) \$10.250 Stucco on expanded metal, wooden inside.
- (e) \$10.500 Natco Hollow Tile, stuccoed, wooden inside.
- (f) \$12,000 Natco Hollow Tile stuccoed—fireproof throughout except roof.
- (g) \$14,000 Natco Hollow Tile walls faced with brick, fireproof floors and roof.
- (h) \$15,500 Face Brick walls—fireproof floors and roof.

The above figures are based on an average taken from two architects and two builders, who have had experience with the methods of construction designated.





*View them near
at home where all their
worth and pride is plac'd
And there their hospitable
fires burn clear*

Halleck



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